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THE CAPITAL GOODS INDUSTRY IN LATIN AMERICA: PRESENT SITUATION AND PROSPECTS

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This paper was prepared by Mr. Karl Heinz Plaetzer, UNIDO consultant. The views expressed do not necessarily reflect the views of the UNIDO secretariat.

Preface

This present document was prepared by Mr. Karl Heinz Plaetzer, UNIDO consultant, who worked together with the ECLA Capital Goods Project team in Santiago, Chile at the beginning of 1983. The main results of this study will ultimately be integrated into UNIDO's programme for studies on the capital goods sector, along with similar surveys for other regions of the world. It was presented to a Joint ECLA/UNIDO Expert Group Meeting on Capital Goods in Latin America, convened at ECLA Headquarters from 5-7 December 1983, as a background and discussion paper.

Tables without explicit indication of source as a rule reproduce material from working papers of the Capital Goods Project.

The views expressed are those of the consultant and do not necessarily reflect the views of the UNIDO secretariat, of ECLA or of the Capital Goods Project. Furthermore, the results of the analyses should not prejudge the final outcome of the ECLA Capital Goods Project.

UNIDO expresses its gratitude to the staff members of ECLA working on the capital goods project for their valuable contribution and co-operation.

Table of contents

		Page
Summary		
1.	Introduction	1
2.	The status of industrial development in Latin America, prospects and potentialities of creating capital goods and related industries	3
2.1	General remarks	3
2.2	Achievements in industrialization	4
2.2.1	Industrial production	4
2.2.2	Global comparisons	11
2.2.3	Structure of industry	15
2.3	The role of government in industrial development	22
2.3.1	Industrial policy	22
2.3.2	Government as entrepreneur	24
2.3.3	Government purchasing power	24
2.3.4	International co-operation through creation of regional markets	25
2.4	The role of transnational companies	26
2.4.1	The case of Brazil	29
2.5	Education and training	32
3.	Past and present situation and future trends of the capital goods sector	33
3.1	Production	33
3.1.1	General metal and boiler shops production	33
3.1.2	General equipment for general application	40
3.1.3	Agricultural machinery and equipment	41
3.1.4	Electrical machinery and equipment	45
3.1.5	Railroad equipment	46
3.1.6	Mining equipment	46
3.2	Trade	50
3.2.1	Imports	50
3.2.2	Exports	51
3.3	Investment in capital goods	52
3.4	Present situation and future development of demand by sectors	53
3.4.1	Electricity generation	53
3.4.2	Pulp industry	57
3.4.3	Cement industry	59
3.4.4	Steelmaking	62
3.4.5	Railway equipment	63
3.4.6	Merchant ships	65
3.4.7	Agricultural machinery	66
3.4.8	Mining	67
3.4.9	Sugar industry	69

	Page
4. Approaches to the establishment of capital goods industries in the Latin American countries	70
4.1 The Andean Pact	70
4.1.1 General description	70
4.1.2 Common treatment of foreign capital and foreign technology	74
4.1.3 The joint industrial programme	76
4.2 Other regional treaties with relevance for the capital goods sector	82
4.2.1 Economic System of Latin America (SELA)	82
4.2.2 Latin American Association of Integration (ALADI)	83
4.2.3 The Central American Common Market (CACM)	84
4.2.4 The Caribbean Community (CARICOM)	85
4.2.5 Financial and monetary co-operation	85
4.3 National Development Plans	86
4.4 Financing in the capital goods sector	87
4.5 Examples of national activities for the promotion of capital goods production	90
4.5.1 The Ecuadorian capital goods commission	92
4.5.2 The National Council for the development of the capital goods industry in Venezuela	94
4.5.3 The capital goods corporation in Chile	95
5. Aspects of strategy for establishing capital goods and related industries	96
5.1 Possible activites on national levels	96
5.1.1 Industrial policy	96
5.1.2 Institutional framework	97
5.1.3 Technology information basis and technological advancement	98
5.1.4 Public purchases	98
5.1.5 Technical assistance	99
5.2 Possible activites on the regional level	100
5.2.1 Regional meeting	101
5.2.2 Institutional framework	101
5.2.3 Promotion of industrial co-operation	102
List of references	105

Tables

		Page
1.	Manufacturing value added as a percentage of GDP in Latin America	5
2.	Average annual growth rates in Latin America of population and gross manufacturing product at market prices in 1970 $US	6
3.	Average annual growth rates in Latin America of gross domestic product at market prices in 1970 $US	7
4.	Distribution of gross manufacturing product in Latin America	9
5.	Gross manufacturing product per capita at market prices in 1970 $US in Latin America	10
6.	Index numbers of the manufacturing industries in the gross domestic product by regions and selected countries, 1970-1981	12
7.	Gross domestic product of the manufacturing industries by regions and selected countries, 1970-1981	13
8.	Distribution of the gross domestic product of the manufacturing industries by regions and selected countries, 1970-1981	14
9.	Gross domestic product per capita of the manufacturing industries by regions and selected countries, 1970-1981	16
10.	Latin America (15 countries): Structure of the manufacturing industries, 1950-1977	17
11.	Brazil: Structure of the manufacturing industries, 1950-1978	18
12.	Andean Group: Structure of the manufacturing industries, 1950-1977	19
13.	Central American Common Market: Structure of the manufacturing industries, 1960-1975	20
14.	Direct foreign investment in Latin America and the Caribbean, 1967 and 1976	27
15.	Brazil: Transnational corporations investment and sales of capital goods, 1977	30
16.	Brazil: Production and employment shares of enterprises with different ownership in selected sectors, 1977	31
17.	Brazil: Distribution of sales among companies in selected sectors with foreign participation, 1977	32
18.	Production value and value added of the metalworking industry in the Dominican Republic	36

Page

19. Production capacity of boiler shops in selected Latin American countries 38

20. Estimated production capacity for boilers and structural products in selected Latin American countries 39

21. Quoted or constructed storage tanks for oil or gas in Central and South America 40

22. Production of agricultural machinery and implements in Latin America, selected years 42

23. Production of agricultural machinery in various Latin American countries, 1974-1978 42

24. Production of agricultural tractors of more than 10 horsepower in Argentina, Brazil and Mexico, 1970-1982 44

25. Production capacity of electrical motors and power transformers in selected Latin American countries 46

26. Production capacity for railroad freight cars and parts in Chile, Colombia and Peru 47

27. Output of foundries in the Dominican Republic in 1979 49

28. Capital goods imports by 19 Latin American countries 50

29. Exports of capital goods by selected Latin American countries, 1980 51

30. Investments of 19 Latin American countries in capital goods 52

31. Development of electricity generating capacity in Latin America, 1960-2000 54

32. Latin America: Turbines to be installed in the period 1980-2000 55

33. Latin America: Thermoelectric groups to be installed in the period 1980-2000 56

34. Demand for pulp plants, 1982-1991 58

35. Demand for equipment for the production of pulp, 1982-1991 58

36. Demand for new lines of rotary kilns for cement production in Latin America, 1982-1991 60

37. Demand estimates for specific machinery and equipment in the cement industry, 1982-1991 61

Page

38. Latin America: present and projected capacity of the steel-making industry based on a hypothesis of major probability 63

39. Demand for rolling material for railways in Latin America, 1980-1990 64

40. Latin American imports and exports of agricultural machinery and implements share of the region in world trade 1971 and 1975-1981, in constant 1975 $US million 67

41. Argentina, Brazil, Chile, Peru, Venezuela: Demand estimate of machinery and equipment for mining, 1983-1992 70

42. Bolivia, Colombia, Ecuador, Peru: Trade in products forming part of the metalworking sector programme 81

43. General indicators on national development plans 88

44. Some indications on the availability of financing of sales for capital goods 89

45. Available credit facilities for the export of capital goods in selected countries 91

46. CEBCA: minimum national participation in the execution of investment projects, 1983-1987 93

EXPLANATORY NOTES

References to dollars ($) are to United States dollars, unless otherwise stated.

A comma (,) is used to distinguish thousands and millions.

A full stop (.) is used to indicate decimals.

A slash between dates (e.g., 1980/81) indicates a crop year, financial year or academic year.

Use of a hyphen between dates (e.g., 1960-1965) indicates the full period involved, including the beginning and end years.

Metric tons have been used throughout.

The following forms have been used in tables:

Three dots (...) indicate that data is not available or is not separately reported.

A dash (-) indicates that the amount is nil or negligible.

A blank indicates that the item is not applicable.

Totals may not add up precisely because of rounding.

Summary

1. Latin America and the Caribbean can be divided into 3 groups of countries with respect to its industrial development: the three large countries Argentina, Brazil, and Mexico which account for approximately 78 per cent of industrial installations; the five medium-sized countries Chile, Colombia, Peru, Uruguay and Venezuela achieving 16 per cent; the eleven small countries Bolivia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Panama and Paraguay with approximately 6 per cent of industry. Not included are Cuba (due to unavailability of statistical data) and the English-speaking Caribbean countries, of which Jamaica and Trinidad and Tobago have a certain importance for the capital goods sector.

2. Industrial value added stood at approximately $US 229 per capita, whereby the three large countries averaged $US 280 (Mexico is leading with $US 342), the medium-sized countries averaged $US 176 and the small ones averaged $US 88. For Asia this figure was $US 34 and for Africa $US 29 in 1981.

3. Composition of industrial production changed considerably in the last three decades: non-durable consumer goods made up two-thirds of industrial production in 1950 but only one-third in 1977. In the same period the importance of the metalworking industry rose from 11 to 24 per cent. In Brazil the metalworking sector contributed approximately 30 per cent to the industrial value added, in the Andean Pact countries approximately 15 per cent, and in the Central American Common Market approximately 9 per cent at the end of the 1970s. These figures indicate clearly the more advanced stage which Brazil has reached and the growth potential which exists for the medium-sized and small countries in the metalworking and capital goods sectors, if appropriate measures to develop this industrial activity are taken. This possibility receives support if one takes a closer look at the composition of value added at subsector level.

4. The achievements in industrial development stem from the important role which the governments attributed to industry in the economic context. Economic policies in Latin America are in effect essentially industrial

policies. The public sector took over the role of guiding private investments through incentive schemes, and only intervened directly in the investment process if the nature of investment (high risk or high capital intensity) so demanded. The governments supported industrial development through regional and sub-regional treaties creating bigger market outlets. Transnational corporations have participated to a large extent in the industrial opportunities created through government policies.

5. Production of capital goods (statistical data are hardly available on a regional basis) is relatively advanced in the three big countries, moderately existing in the medium-sized countries and incipient in the small-sized ones. Production in the medium- and small-sized countries can be increased through specialization, regional or sub-regional complementation of production and sub-contracting.

6. A future outlook on the demand by sector shows that hydro-electricity generation will be of considerable importance to the capital goods sector in the last decade of this century. Other demand sectors described are pulp industry, cement industry, steelmaking, railway equipment, merchant ships, agricultural machinery, mining and sugar industry. The two latter sectors might have especially good possibilities for additional production in the medium- and small-sized countries through specialization and production sharing.

7. The institutional framework for the promotion of the Latin American capital goods sector centres around organizations such as the Andean Pact, ALADI (the successor to the Latin American Free Trade Area), the Central American Common Market and the Caribbean Community. A detailed description of the metalworking programme of the Andean Pact is provided as an example of possibilities of co-operation on a subregional level.

8. The national development plans of selected Latin American countries underline that industrial policy mainly serves the purpose of creating a positive environment for private investment with only casual direct public intervention. Public activities, however, are more common in areas such as mixed industrial and governmental commissions in order to stimulate national

production of capital goods. Those activities, among other topics in the capital goods sector, have received UNIDO support in Colombia, Ecuador, Guatemala, Mexico, Peru, Trinidad and Tobago (now in preparation) and Venezuela. Two UNIDO projects on the metalworking sector and a "buy national" system in the Dominican Republic could be considered as forerunners of such a programme.

9. Components of possible future actions can be defined on national, regional or subregional levels. On the national level, they could be of the type already experienced by UNIDO in the above-mentioned countries. On a regional or subregional level, they could consist of regional meetings on means of strengthening the political and institutional framework, policy co-ordination and promoting industrial co-operation. For the sub-regions Central America and the Caribbean, a regional co-ordination project based on sectoral approaches to the local production and subregional exchange of capital goods is recommended. This co-ordinative effort would concentrate on complementation, subcontracting and specialization in sectors such as sugar industry equipment and spare parts, energy technology and food industry equipment.

1. INTRODUCTION

The ECLA project on the capital goods sector, financed by UNDP and with UNIDO as associated agency, is entitled "Present situation and perspectives of supply and production of capital goods in Latin America".*/

The work on the project will entail, inter alia, the following elements:

(a) An estimate of the present demand of capital goods (globally and by sector);

(b) A forecast of the global demand for 1985 and 1995;

(c) A medium- and long-term forecast of important sectors such as equipment for the food industry, agricultural machinery, construction machinery, machine tools, transport equipment, equipment for petrochemicals and fertilizers, heavy electrical machinery, steel-making equipment, mining and oil producing equipment;

(d) An evaluation of the role of the public sector in the present demand of capital goods;

(e) An estimate of the present production capacity of capital goods on a global level and for some sectors;

(f) Identification of the measures applied in the Latin American countries to promote the development of the capital goods industries;

(g) Special attention to the development possibilities of the sector in countries with small- and medium-sized markets;

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*/ Project No. RLA/77/015. For a closer description of the project see document E/CEPAL/SEM.13.R.2 "La Situación y las Perspectivas de la Producción y el Abastecimiento de Bienes de Capital en América Latina" which was issued by ECLA for the joint UNIDO/ECLA Expert Group Meeting 5-7 December 1983. See also J. Beckel and S. Lluch "Capital goods and the advance of industry", CEPAL Review No. 17, August 1982.

(h) A description and analysis of the world-wide supply and of the characteristics of the international trade of capital goods in some of the strategic sectors mentioned under (c); and

(i) An estimate, on the basis of criteria established during the study, of the expansion possibilities of the internal production and the external negotiation capacity of the region.[28/]

Special attention should be drawn in this context to the Lima Declaration and Plan of Action of 1975 which called for a significant increase in industrial production in the developing countries and which is of great relevance to the capital goods sector. Furthermore, the close relationship between the demand for capital goods and total investment, their share in foreign trade, their linkages to other productive sectors and the effects of production of capital goods on industrial dynamics, employment and the technological level of the countries are some of the reasons for the interest in this sector.

This report discusses the following topics:

A. The prospects and potentialities of the capital goods sector in Latin America with special treatment of the roles of the governments and the transnational corporations.

B. An analysis of the capital goods sector in Latin America, describing the actual scope of production, trade and demand and the future development of selected demand sectors.

C. A summary of institutional approaches in the capital goods sector in Latin America which covers both regional and national aspects.

D. Recommendations for strategies at national and regional levels to further develop the capital goods sector in Latin America.

2. THE STATUS OF INDUSTRIAL DEVELOPMENT IN LATIN AMERICA: PROSPECTS AND POTENTIALITIES OF CREATING CAPITAL GOODS AND RELATED INDUSTRIES

2.1 General remarks

During the last three decades the development of Latin America was directly related to the industrialization of the continent. Advances in industrial output by magnitude and scope of product were often equated with achievements in development in general terms. This can be noted in all countries, whether small or large, and for industrial development regardless of the sector of industry.

At the same time modern technology was given a special role to contribute to the necessary sociological changes in the societies. Science and technology received broad acceptance in Latin America, and university education in engineering and scientific disciplines rose considerably. Thus, broad acceptance of "industrial choice" and the availability of a work force with profound knowledge in science and engineering, plus the readiness to absorb and utilize imported industrial know-how, have laid the basis for advances in industrialization in Latin America.

The governments' support of this modernization of societies was an important asset for its success. The role of the governments was in general not so much on the "primary" side, i.e. direct industrial investments, but more on the "secondary" side, such as technical training for the work force, legislation, financial and tax incentives, export promotion, etc. In short, the governments stimulated and supported the private initiatives to expand industrial production, set the general goals for the social environment in the form of labour laws and protective measures, and gave assistance and guidance to the process of industrialization through the creation of a multitude of special regional and sectoral institutions scientific, financial, technical assistance, and export-promotion activities. Special attention was paid by the governments to the potential of the industrial sector to absorb the large labour force created by the demographic explosion of Latin America.

Since the late 1940s ECLA has played an active role in the promotion of the process of industrialization in Latin America. It defined industrialization as the dynamic factor of growth and mentioned especially the capability of the industrial sector to absorb modern technology, create employment, incorporate redundant rural populations and resolve external balance-of-payment problems. The production of the industrial sector was to be directed towards internal markets to satisfy the basic needs of the population. This required, among other factors, long-term development programming and an active promotional role by the governments to orient the process of industrialization and direct investment and social patterns. 21/

2.2 Achievements in industrialization

2.2.1 Industrial production

As shown in table 1, the industrialization of Latin America made considerable progress in the last three decades, even if the growth rates for individual countries differ considerably.

Manufacturing value added as a percentage of GDP (see table 1) rose from 19 per cent in 1950 to 25 per cent in 1973 for the whole region, but fell again to 24 per cent in 1981. Table 2 demonstrates clearly that there have been at least three or maybe four phases of industrial development in the region. Phase I ranges from 1950 to 1965 and shows growth of the manufactured GDP (see table 2) at an average rate of 6.3 per cent per year. Phase II ranges from 1965 to 1973 and shows an increased growth rate to 8.1 per cent per year. Phase III follows from 1973 to 1980 with a more moderate growth of 5.2 per cent per year. The growth rates during the period 1980 to 1981 and 1981 to 1982 are negative, -2.2 and -1.4 per cent respectively, perhaps indicating a new situation (phase IV) for the industrial sector.

Table 1 indicates more precisely the situation of the industrial sector. Until 1973 (phase I and II), the GDP attributable to manufacturing grew at a higher rate than total GDP, i.e. the degree of industrialization advanced. It remained stable at 25 per cent until 1980 (phase III). On a national basis,

Table 1. Manufacturing value added as a percentage of GDP in Latin America

	1950	1965	1973	1980	1981	1982 a/
Large countries	21	24	27	27	25	25
Argentina	23	28	31	27	24	24
Brazil	20	24	28	28	26	27
Mexico	19	22	24	25	25	24
Medium-sized countries	17	20	21	21	20	19
Chile	22	26	27	22	22	20
Colombia	14	18	20	20	19	18
Peru	18	23	24	24	24	23
Uruguay	22	25	25	26	25	23
Venezuela	12	16	16	18	17	18
Small countries	13	15	17	18	18	18
Bolivia	13	13	14	16	16	14
(CACM) b/	(12)	(15)	(18)	(18)	(18)	(18)
Costa Rica	14	16	19	21	21	21
Dominican Republic	14	14	19	18	18	18
Ecuador	18	19	17	23	23	22
El Salvador	14	13	19	18	16	16
Guatemala	12	14	16	17	17	16
Haiti	8	9	11	13	13	13
Honduras	7	12	14	15	16	16
Nicaragua	11	17	21	25	23	23
Panama	8	15	15	10	10	10
Paraguay	15	15	17	16	16	15
Total (19 countries)	19	22	25	25	24	24

a/ Preliminary estimates.

b/ Central American Common Market.

Source: ECLA, official statistics.

Table 2. Average annual growth rates in Latin America of population and gross manufacturing product at market prices in 1970 $US
(per cent)

	Population 1960-1982	Gross manufacturing product 1950-65	1965-73	1973-80	1980-81	1981-82	1950-82
Large countries	2.6	6.4	9.0	5.5	-3.0	-0.3	6.3
Argentina	1.4	4.8	5.0	3.2	-16.0	-5.4	2.8
Brazil	2.7	7.3	12.0	6.8	- 6.4	1.7	7.7
Mexico	3.2	7.2	8.5	6.7	7.5	-1.0	7.2
Medium-sized countries	2.6	6.3	4.9	3.7	0.5	-5.5	4.8
Chile	1.9	5.1	3.7	0.6	2.6	-20.4	2.8
Colombia	2.5	6.2	7.7	4.8	- 1.0	-2.0	5.8
Peru	2.8	7.2	4.6	2.9	1.8	-1.1	5.1
Uruguay	0.7	2.7	1.0	5.6	- 3.2	-16.5	2.0
Venezuela	3.7	9.5	4.9	5.3	0.3	1.5	6.9
Small countries	2.9	5.7	7.9	6.0	0.9	-3.6	5.8
Bolivia	2.5	2.0	7.6	5.5	-2.9	-14.0	3.4
(CACM)[a/]	(3.1)	(7.0)	(7.3)	(4.5)	(-3.4)	(-6.7)	(5.8)
Costa Rica	2.9	7.8	9.4	6.5	-1.1	-6.6	7.1
Dominican Republic	2.7	4.7	13.0	4.7	2.1	3.2	6.6
Ecuador	3.0	5.3	7.1	10.8	6.6	-3.7	6.7
El Salvador	3.1	7.2	5.8	1.2	-17.3	-6.6	4.2
Guatemala	3.1	5.4	7.7	6.0	-1.0	-5.0	5.6
Haiti	2.3	1.5	6.0	6.7	-0.9	0.0	3.9
Honduras	3.3	8.3	6.3	5.8	2.1	1.0	6.8
Nicaragua	3.2	9.5	6.9	2.2	0.8	-3.0	6.6
Panama	2.7	10.0	8.1	-1.8	-2.2	1.8	6.2
Paraguay	2.9	3.4	6.8	8.6	7.9	-4.4	5.2
Total (19 countries)	2.7	6.3	8.1	5.2	-2.2	-1.4	6.0

a/ Central American Common Market.

Source: ECLA, official statistics.

Table 3. Average annual growth rates in Latin America of gross domestic product at market prices in 1970 $US
(per cent)

	1950-1965	1965-73	1973-80	1980-81	1981-82	1950-82
Large countries	5.1	7.3	6.0	1.3	-0.3	5.7
Argentina	3.4	3.8	2.3	-6.1	-5.0	2.7
Brazil	6.0	9.6	7.1	-1.9	1.0	6.7
Mexico	6.4	6.9	6.4	8.1	0.0	6.4
Medium-sized countries	5.1	4.3	4.2	2.5	-2.2	4.4
Chile	3.9	3.1	3.4	5.3	-13.0	3.0
Colombia	4.7	6.2	5.3	2.5	1.5	5.0
Peru	5.6	3.7	3.0	3.9	1.0	4.4
Uruguay	1.7	1.2	4.9	-0.7	-9.5	1.6
Venezuela	7.5	4.6	4.3	0.6	0.0	5.6
Small countries	4.5	6.5	4.9	1.6	-1.6	4.8
Bolivia	2.0	6.0	4.0	-0.6	-7.5	-3.0
(CACM)a/	(5.2)	(5.5)	(3.8)	(-1.5)	(-3.7)	(4.5)
Costa Rica	6.9	7.2	4.8	-3.6	-6.0	5.8
Dominican Republic	4.7	9.0	5.1	3.4	1.5	5.7
Ecuador	5.4	8.3	6.3	4.3	2.0	6.2
El Salvador	5.4	4.7	2.3	-9.5	-4.5	3.7
Guatemala	4.3	6.1	5.2	1.0	-3.5	4.6
Haiti	1.1	2.9	3.9	-3.1	-2.1	1.9
Honduras	5.7	4.6	4.3	-0.4	-1.5	3.9
Nicaragua	6.8	4.0	-0.3	8.9	-1.0	4.3
Panama	6.0	7.5	3.7	3.6	0.5	5.6
Paraguay	3.3	5.1	9.6	8.5	-2.5	5.1
Total (19 countries)	5.2	6.5	5.5	1.5	-0.7	5.3

a/ Central American Common Market.

Source: ECLA, official statistics.

however, Argentina, Chile and Panama showed strong declines in their degree of industrialization. In the two years since 1980, (possibly a phase IV), only Honduras was able to increase its share from 15 per cent in 1980 to 16 per cent in 1982.

The Latin American manufacturing sector is strongly concentrated in the three large countries Argentina, Brazil and Mexico. Table 4 shows that they represent more than three-fourths of the gross manufacturing product of the continent, growing from 70 per cent in 1950 to almost 78 per cent in 1982, even though Argentina lost more than half of its share.

The overwhelming growth of Brazil and Mexico from a share of 43.7 per cent of the industry in the region in 1950 to 67.9 per cent in 1982 shows that past development has favoured the countries with a big internal market. The smaller countries were not really affected by the growth of the big countries. The five countries of the Andean Pact, Bolivia, Colombia, Ecuador, Peru and Venezuela, have lost little ground: their share was 15.3 per cent in 1950 and 14.6 per cent in 1982. The fostering of economic co-operation and long-term industrial planning has certainly contributed to their relatively good performance. It is also noticeable that the existence of petroleum resources was not a decisive factor for the industrial development of the countries.

The manufacturing value added per capita (table 5) gives another picture of the importance of the industrial sector for the different countries. Mexico is leading with US$ 342 per capita in 1982, followed by Uruguay with US$ 304 per capita, which has lost its leading position of 1950. The highest value achieved overall was by Argentina in 1973 (US$ 409), which fell back to third place in 1982. While the gross manufacturing product per capita more than tripled for the large countries, the medium sized and small countries showed a much more moderate growth rate on average, although some of the small countries have performed outstandingly: Costa Rica, the Dominican Republic, Ecuador, and Honduras (admittedly from a very low base) have more than tripled their manufacturing value added per capita from 1950 to 1982, thus showing the highest growth rates of all countries.

Table 4. Distribution of gross manufacturing product in Latin America
(per cent)

	1950	1965	1970	1973	1980	1982 a/
Large countries	70.3	71.2	73.8	76.2	77.6	77.9
Argentina	26.6	21.4	19.1	16.9	12.1	10.0
Brazil	22.4	25.7	29.0	34.3	37.9	37.5
Mexico	21.3	24.1	25.7	25.0	27.6	30.4
Medium-sized countries	23.7	23.3	20.6	18.4	16.7	16.4
Chile	6.8	5.7	5.0	4.1	3.0	2.6
Colombia	5.3	5.2	4.9	5.0	4.9	4.9
Peru	4.6	5.1	4.5	3.9	3.4	3.5
Uruguay	3.7	2.1	1.7	1.3	1.3	1.1
Venezuela	3.3	5.2	4.5	4.1	4.1	4.3
Small countries	6.0	5.5	5.6	5.4	5.7	5.7
Bolivia	0.8	0.4	0.4	0.4	0.4	0.3
(CACM) b/	(23)	(25)	(25)	(24)	(23)	(22)
Costa Rica	0.4	0.4	0.5	0.5	0.5	0.5
Dominican Republic	0.7	0.5	0.7	0.7	0.7	0.8
Ecuador	1.3	1.2	1.1	1.1	1.5	1.6
El Salvador	0.6	0.7	0.6	0.6	0.4	0.3
Guatemala	0.9	0.8	0.8	0.8	0.8	0.8
Haiti	0.2	0.1	0.1	0.1	0.1	0.1
Honduras	0.2	0.2	0.2	0.2	0.2	0.2
Nicaragua	0.2	0.4	0.4	0.3	0.3	0.3
Panama	0.2	0.4	0.5	0.4	0.3	0.3
Paraguay	0.5	0.3	0.3	0.3	0.4	0.4
Total (19 countries)	100.0	100.0	100.0	100.0	100.0	100.0

a/ Preliminary figures.

b/ Central American Common Market.

Source: ECLA, official statistics.

Table 5. Gross manufacturing product per capita at market prices in 1970 $US in Latin America

	1950	1965	1970	1973	1980	1982 a/
Large countries	92	154	200	247	303	280
Argentina	199	310	371	409	383	297
Brazil	54	99	140	199	265	241
Mexico	99	179	231	265	338	342
Medium-sized countries	92	150	166	182	195	176
Chile	144	216	246	251	233	184
Colombia	58	92	109	135	162	151
Peru	73	141	153	161	163	155
Uruguay	209	260	277	268	381	304
Venezuela	82	181	192	200	224	213
Small countries	35	53	67	77	95	88
Bolivia	35	34	46	50	61	48
(CACM) b/	(35)	(62)	(77)	(85)	(94)	(81)
Costa Rica	56	97	130	158	208	183
Dominican Republic	34	43	70	89	102	110
Ecuador	52	73	82	99	165	159
El Salvador	39	72	80	87	77	56
Guatemala	38	55	70	78	94	86
Haiti	10	11	12	14	19	18
Honduras	17	34	43	45	52	50
Nicaragua	27	69	88	92	85	80
Panama	40	109	149	162	120	114
Paraguay	47	53	64	71	100	97
Total (19 countries)	84	139	173	208	249	229

a/ Preliminary figures.

b/ Central American Common Market.

Source: ECLA, official statistics.

2.2.2 Global comparisons

In 1950 the Latin American industrial sector produced approximately 4 per cent of the total world manufacturing output. In 1975, the share of world manufacturing output rose to 5 per cent to achieve 5.2 per cent in 1980 (Table 8). While the world-wide manufacturing value added index rose only to 157 in 1981 (1970=100), the index for Latin America rose to 183, and to 191 for the developing countries in total (see table 6). Since 1976 Asian countries have surpassed Latin America in their growth of manufactured output. This is because of the increasing difficulty of coping with the problems facing industry in Latin America. Latin America's industrial output, although very heterogeneous according to each country, has reached a stage where additional economic (cost) and technological (quality) advances are necessary to compete on the international market. The fact that Latin America and the Caribbean still had a share of the manufactured GDP of the developing countries of approximately 54 per cent in 1981, US$ 70,986 million out of US$ 131,193 million for all developing countries compared to 10 per cent for Africa or 36 per cent for Asia (see table 7) should not be a cause for overlooking the difficulties of industrial production in Latin America.

Most certainly one of the weak points of Latin American industry is the small share of exported manufactures.[3/] This share was only 7 per cent of manufactured output in 1975, whereas it was 30 per cent in Asia and the Middle East (without Japan and Israel) and 13 per cent in Africa. Latin America's industrial strategy has been directed more towards import substitution than to participation in world-wide exports. In 1955 Latin America accounted for 13 per cent of world imports of industrial goods and in 1975 this figure fell to 7.2 per cent. In terms of policy achievements this was certainly an outstanding result, even though it could not prevent an overall negative trade balance for the continent. The increase of exports of manufactured goods from 3 per cent in 1955 to 26 per cent in 1978 was not sufficient to bring about positive trade balances.

Table 6. Index numbers of the manufacturing industries in the gross domestic product by regions and selected countries. 1970-1981 a/
(1970 = 100)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
World	100	(104)	(112)	(122)	(124)	(122)	(133)	(139)	(146)	(152)	(154)	(157)
Market economies	100	(103)	(110)	(120)	(119)	(114)	(124)	(129)	(135)	(141)	(141)	(141)
Developed	100	(102)	(109)	(119)	(117)	(111)	(121)	(125)	(130)	(136)	(135)	(136)
North America	100	102	111	120	115	108	117	125	132	136	127	130
Europe	100	(102)	(108)	(116)	(117)	(111)	(118)	(120)	(122)	(126)	(127)	(124)
EEC	100	102	107	115	116	110	118	121	122	127	126	123
EFTA	100	103	108	115	119	111	114	115	116	122	127	126
Others	100	107	122	137	143	145	151	155	161	163	166	(157)
Japan	100	103	114	131	130	125	142	155	165	178	191	196
Israel	100	110	123	130	136	139	146	156	164	172	167	178
South Africa	100	102	105	115	122	124	126	123	130	143	157	-
Australia and New Zealand	100	103	108	116	111	112	115	112	113	117	118	-
Developing	100	(107)	(117)	(130)	(141)	(145)	(157)	(165)	(177)	(184)	(190)	(191)
Latin America and the Caribbean	100	108	118	129	136	145	154	158	165	178	187	183
Asia (excluding Japan)	100	106	114	128	134	141	160	173	190	(191)	(192)	(206)
Middle East (excluding Israel)	100	111	123	138	152	164	184	200	216			
Africa (excluding South Africa)	100	104	112	123	131	130	140	151	161	176	182	191
Centrally planned economies	100	109	118	129	141	153	163	174	185	193	203	212

a/ The index numbers in parentheses have not been used in evaluating the GDP.

Source: ECLA, based on United Nations publications.

Table 7. Gross domestic product of the manufacturing industries by regions and selected countries, 1970-1981
(millions of 1970 $US)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
World	902,104	940,226	1,013,179	1,104,172	1,123,689	1,116,092	1,202,205	1,268,993	1,329,307	1,385,297	1,395,506	1,422,691
Market economies	602,816	712,102	766,219	834,196	828,593	795,881	861,066	904,832	942,124	981,371	970,651	979,000[b]
Developed	624,256	632,548	686,210	745,911	735,279	697,303	753,917	792,255	822,305	856,707	841,573	847,807
North America	274,420	279,908	304,606	329,304	315,583	296,374	321,071	343,025	362,234	373,211	348,513	356,746
Europe	261,159	267,242	281,409	302,775	306,855	291,463	310,610	317,946	321,113	334,141	333,804	325,926
EEC	219,572	223,963	234,942	252,508	254,704	241,529	259,095	265,682	267,878	278,856	276,661	270,074
EFTA	30,491	31,406	32,930	35,065	36,284	33,845	34,760	35,065	35,370	37,199	38,724	38,419
Others	11,096	11,873	13,537	15,202	15,867	16,089	16,755	17,199	17,865	18,086	18,419	17,433[b]
Japan	72,078	74,240	82,169	94,442	93,701	90,098	102,351	111,721	118,929	128,299	137,669	141,273
Israel	1,353	1,488	1,664	1,759	1,840	1,881	1,975	2,111	2,219	2,327	2,260	2,408
South Africa	3,428	3,497	3,599	3,942	4,182	4,251	4,319	4,216	4,456	4,902	5,382	21,454
Australia and New Zealand	11,818	12,173	12,763	13,709	13,118	13,236	13,591	13,236	13,354	13,827	13,945	
Developing	68,560	73,554	80,000	88,285	93,314	98,578	107,149	112,577	119,819	124,664	129,078	131,193[b]
Caribbean and South America	38,790	41,893	45,772	50,039	52,754	56,246	59,737	61,288	64,004	69,046	72,537	70,986
Asia (excluding Japan)	17,953	19,030	20,466	22,980	24,057	25,314	28,725	31,059	34,111	43,671[c]	43,899	46,940[b]
Middle East excluding Israel)	4,871	5,407	5,991	6,722	7,404	7,988	8,963	9,742	10,521			
Africa (excluding South Africa	6,946	7,224	7,780	8,544	9,099	9,030	9,724	10,488	11,183	11,947	12,642	13,267
Centrally planned economies	209,288	228,124	246,960	269,982	295,096	320,211	341,139	364,161	387,183	403,926	424,855	443,691

a/ The countries of the regions are as in table 6.
b/ Calculations based on differences.
c/ Calculations based on the total growth rate index numbers.

Source: ECLA, based on indicators of table 1. The figures of 1970 were taken as the base year for the analysis of the world distribution of the manufacturing industries (see table 4 and methodology in the text).

Table 8. Distribution of the gross domestic product of the manufacturing industries by regions and selected countries, 1970-1981
(world = 100)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
World	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Market economies	76.8	75.7	75.6	75.5	73.7	71.3	71.6	71.3	70.9	70.8	69.6	68.8
Developed	69.2	67.9	67.7	67.5	65.4	62.5	62.7	62.4	61.9	61.8	60.3	59.6
North America	30.4	29.7	30.1	29.8	28.1	26.5	26.7	27.0	27.3	26.9	25.0	25.1
Europe	28.9	28.4	27.8	27.5	29.3	26.1	25.8	25.1	24.2	24.1	23.9	22.9
EEC	24.3	23.8	23.2	22.9	22.7	21.7	21.5	20.9	20.2	20.1	19.8	19.0
EFTA	3.4	3.3	3.3	3.2	3.2	3.0	2.9	2.8	2.7	2.7	2.8	2.7
Others	1.2	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.3	1.2
Japan	8.0	7.9	8.0	8.4	8.3	8.1	8.5	8.8	8.9	9.3	9.8	9.9
Israel	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
South Africa	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.4	-
Australia and New Zealand	1.3	1.3	1.2	1.2	1.1	1.2	1.1	1.0	1.0	1.0	1.0	-
	7.6	7.8	7.9	8.0	8.3	8.8	8.9	8.9	9.0	9.0	9.3	9.2
	4.3	4.4	4.5	4.5	4.7	5.0	5.0	4.8	4.8	5.0	5.2	5.0
Asia (excluding Japan)	2.0	2.0	2.0	2.1	2.1	2.3	2.4	2.5	2.6	3.1	3.2	3.3
Middle East (excluding Israel)	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9
Africa (excluding South Africa)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9
Centrally planned economies	23.2	24.3	24.4	24.5	26.3	28.7	28.4	28.7	29.1	29.2	30.4	31.2

Source: ECLA, official statistics.

2.2.3 Structure of industry

A substantial change in the structure of industry occurred with industrial growth in the last three decades in Latin America. While in 1950 the production of non-durable consumer goods accounted for almost two-thirds of industrial value added (food and beverages alone represented nearly one-third), their importance was reduced to one-third in 1977 (see table 10). At the same time the production in the metalworking industry increased from approximately 11 per cent to almost 25 per cent in the same period, chemical products from 5 per cent to 15 per cent and basic iron and steel from 4 per cent to 9 per cent. Separate data on capital goods are not available.

Within the metalworking sector, which includes durable consumer goods and capital goods, the strongest increases occurred in electrical machinery from less than 1 per cent to almost 6 per cent share of the total value added, and in transportation equipment, from more than 2 per cent to almost 8 per cent.

Tables 11 through 13 indicate the structure of industry in Brazil, the Andean Pact countries (Bolivia, Colombia, Ecuador, Peru and Venezuela), and the Central American Common Market (Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua). In all countries the importance of non-durable consumer goods has been reduced over the course of time. The metalworking sector has increased, but in different degrees. Brazil's metalworking sector oscillated around 30 per cent of value added in the mid-seventies, whereas this sector achieved approximately half of the Brazilian value (i.e. 15 per cent) in the Andean Pact countries and only one third (i.e. roughly 10 per cent) in the Central American Common Market. While Brazil's metalworking sector contributed almost 20 per cent of value added in 1960, the figures were approximately 8 per cent and 4 per cent, respectively, for the other two groups of countries. Obviously these countries started later in metalworking products and this are could represent quite considerable growth potential for the next decade or more.

Table 9. Gross domestic product per capita of the manufacturing industries by regions and selected countries. 1970-1981
(in $US 1970)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
World	325	332	351	376	375	366	387	402	414	424	419	418
Market economies	288	290	305	326	317	299	317	327	334	342	331	327
Developed	889	896	953	1,026	1,000	942	1,011	1,055	1,086	1,124	1,093	1,094
North America	1,214	1,222	1,319	1,407	1,337	1,240	1,332	1,412	1,473	1,499	1,383	1,405
Europe	784	795	830	888	895	847	900	919	925	960	954	929
EEC	875	885	921	983	987	936	1,000	1,026	1,030	1,073	1,060	1,031
EFTA	782	785	823	877	907	826	848	855	863	907	945	937
Others	258	276	308	346	353	358	372	374	388	385	384	363
Japan	700	700	768	866	852	804	906	980	1,034	1,106	1,177	1,197
Israel	451	496	555	586	613	627	494	528	555	582	565	602
South Africa	156	152	150	164	167	170	166	156	159	175	186	--
Australia and New Zealand	788	761	798	857	772	779	800	779	786	813	775	-
Developing	40	42	45	48	50	51	54	56	58	59	60	59
Caribbean and South America	137	144	153	163	168	175	181	181	185	195	200	191
Asia (excluding Japan)	18	18	19	21	22	22	25	26	28	33	32	34
Middle East (excluding Israel)	69	74	80	87	94	97	107	112	118			
Africa (excluding South Africa)	21	21	22	24	25	24	25	26	27	28	29	29
Centrally planned economies	569	615	659	714	775	834	879	931	983	1,015	1,062	1,101

Source: ECLA, official statistics.

Table 10. Latin America (15 countries)[a/]: structure of the manufacturing industries, 1950-1977
(percentages of value added)

ISIC	Industry	1950[b/]	1955[b/]	1960[c/]	1965	1970	1971	1972	1973	1974	1975	1976[d/]	1977[d/e/]
311-312, 313-314	Food, beverages and tobacco	31.0	28.6	26.7	24.4	23.0	21.9	21.4	20.3	20.4	20.7	19.8	18.9
321	Textiles	15.9	14.7	11.9	10.2	8.8	8.9	8.6	8.4	8.0	8.2	7.9	7.8
322-324	Wearing apparel and footwear	8.1	7.1	5.5	4.5	3.6	3.9	3.7	3.6	3.4	3.5	3.2	3.0
323	Leather	1.0	0.9	0.7	0.6	0.8	0.5	0.5	0.4	0.4	0.4	0.4	0.3
332	Furniture	2.2	1.9	1.7	1.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.5
342	Printing and publishing	4.2	4.0	3.5	3.3	3.2	3.0	2.9	2.8	2.6	2.6	2.7	2.8
390	Other manufactures	1.0	0.9	0.9	0.9	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	Subtotal Group A	63.4	58.1	50.9	45.5	41.8	40.4	39.3	37.7	37.0	37.6	36.2	35.1
331	Wood and cork products	2.9	2.4	2.3	2.1	1.8	1.9	1.9	1.7	1.7	1.7	1.8	2.1
341	Paper and paper products	2.2	2.4	2.1	2.5	2.6	2.5	2.4	2.4	2.4	2.3	2.4	2.4
351-352, 356	Industrial chemicals, other chemicals and plastic products	5.4	7.3	8.8	10.0	11.3	11.6	12.0	12.2	12.2	12.6	13.5	14.7
353-354	Petroleum refineries and misc. products of petroleum and coal	4.8	5.6	6.0	6.6	6.3	6.3	6.0	6.2	6.9	5.6	5.8	4.3
355	Rubber products	1.5	1.8	1.8	1.9	2.0	2.1	2.1	2.1	2.2	2.2	2.3	2.3
361-362, 369	Manufacture of mon-metallic mineral products	5.3	5.6	4.9	4.6	5.1	5.0	5.0	5.0	5.1	5.4	5.4	6.1
371-372	Iron and steel and non-ferrous metals	3.6	4.6	5.7	7.0	7.3	7.2	7.5	7.3	7.5	7.6	7.4	8.5
	Subtotal Group B	25.7	29.7	31.7	34.6	36.4	36.6	36.8	36.9	38.0	37.4	38.6	40.4
381	Metal products	4.3	4.6	4.6	5.6	5.8	5.7	5.8	5.7	5.4	5.6	5.4	5.0
382	Non-electrical machinery	2.9	3.5	4.2	4.4	4.5	5.0	5.4	5.9	5.6	5.4	5.8	5.1
383	Electrical machinery	0.9	1.1	3.0	3.8	4.3	4.4	4.6	4.9	4.5	4.7	5.0	5.7
384	Transport equipment	2.4	2.6	5.1	5.5	6.7	7.2	7.5	8.2	8.9	8.7	8.3	7.9
385	Professional equipment	0.4	0.4	0.5	0.6	0.4	0.6	0.7	0.7	0.6	0.6	0.6	0.8
	Subtotal Group C	10.9	12.2	17.4	19.9	21.8	23.0	24.0	25.4	25.0	25.0	25.2	24.5
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECLA, official statistics.

a/ Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, Peru and Venezuela.

b/ Excluding Bolivia, Chile, Paraguay and member countries of the Central American Common Market (Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

c/ Excluding Paraguay.

d/ Excluding member countries of the Central American Common Market.

e/ Excluding Argentina.

Table 11. Brazil: structure of the manufacturing industries, 1950-1978
(percentage of the value added)

ISIC	Industry	1950	1955	1960	1965	1970	1971	1972	1973	1974	1975	1976	1977	1978
311/312	Food	18.7	16.9	15.7	14.2	13.5	12.4	12.5	11.6	11.5	11.4	11.2	11.7	11.3
313	Beverages	4.2	4.2	2.9	2.8	2.3	2.1	2.1	2.0	2.0	1.9	2.0	2.2	2.2
314	Tobacco	1.8	2.1	1.4	1.4	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1
321	Textiles	22.2	20.3	16.5	13.2	9.6	9.7	8.8	8.0	7.5	7.6	7.1	7.0	6.7
322	Wearing apparel	10.1	9.2	6.2	5.3	3.2	3.8	3.5	3.2	3.0	3.0	2.9	2.7	2.7
323	Leather	-	-	-	-	.6	-	-	-	-	-	-	-	-
324	Footwear	-	-	-	-	-	-	-	-	-	-	-	-	-
332	Furniture	3.3	2.6	2.6	2.4	1.8	2.0	1.9	1.8	1.7	1.8	1.9	1.8	1.8
342	Printing and publishing	4.0	4.7	4.4	4.1	3.7	3.1	2.8	3.1	2.8	2.7	2.9	2.9	2.8
361	Pottery, china and earthenware	-	-	-	-	-	-	-	-	-	-	-	-	-
390	Other manufactures	1.3	1.3	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Subtotal Group A	65.6	61.3	51.2	44.9	37.5	35.8	34.4	32.2	31.1	31.0	30.6	30.9	30.0
331	Wood and cork products	4.0	3.7	3.6	3.3	2.5	2.7	2.7	2.4	2.4	2.5	2.6	2.7	2.7
341	Paper and paper products	2.5	2.3	2.3	2.5	2.6	2.5	2.3	2.2	2.2	1.8	1.9	1.9	2.0
351	Industrial chemicals	2.8	5.4	7.2	9.9	3.2	10.9	11.1	11.5	11.9	11.9	12.8	12.8	13.0
352	Other chemical products	-	-	-	-	7.9	-	-	-	-	-	-	-	-
353	Petroleum refineries	-	-	-	-	3.2	-	-	-	-	-	-	-	-
354	Miscellaneous products of petroleum and coal	1.0	2.0	2.5	3.6	.6	3.5	3.3	3.8	3.8	4.1	3.9	3.8	3.9
355	Rubber products	-	-	-	-	-	-	-	-	-	-	-	-	-
356	Plastics	2.6	2.6	3.0	3.1	2.0	3.9	3.9	4.0	4.5	2.3	2.3	2.2	2.2
362	Glass and glass products	-	-	-	-	1.9	-	-	-	-	2.2	2.3	2.3	2.7
369	Other non-metallic mineral products	5.2	6.5	5.8	5.2	5.9	5.5	5.5	5.4	5.9	6.3	6.2	6.6	6.6
371	Iron and steel	5.2	5.1	5.9	6.8	7.5	7.5	7.4	6.8	6.9	7.3	7.2	7.8	7.8
372	Non-ferrous metals													
	Subtotal Group B	23.4	27.5	30.2	34.4	37.3	36.5	36.2	36.1	37.6	38.5	39.2	40.2	40.8
381	Fabricated metal products	-	2.9	3.4	3.9	4.3	4.7	5.0	5.4	5.2	5.2	5.2	5.0	4.8
382	Machinery except electrical		5.5	6.4	6.8	7.0	7.6	8.1	8.8	8.4	7.4	7.5	6.9	6.7
383	Electrical machinery	10.9	1.2	3.2	4.3	5.3	5.7	6.0	6.5	5.4	5.6	5.9	5.9	6.0
384	Transport equipment		1.2	5.2	5.1	8.0	8.9	9.6	10.3	11.7	11.5	10.9	10.4	11.0
385	Professional equipment		0.2	0.4	0.5	.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Subtotal Group C	10.9	11.1	18.6	20.6	25.2	27.6	29.4	31.7	31.5	30.5	30.2	28.9	29.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECLA, official statistics.

Table 12. Andean Group: structure of the manufacturing industries, 1950-1977 (percentages of the value added)

ISIC	Industry	1950 a/	1955 a/	1960	1965	1970	1971	1972	1973	1974	1975	1976 a/	1977 b/
311/312	Food	23.9	21.8	20.1	19.8	20.1	19.4	18.6	17.3	17.6	19.8	18.7	17.5
313	Beverages	12.9	11.3	10.6	9.2	9.0	8.8	8.9	8.6	7.9	9.4	9.8	10.8
314	Tobacco	5.5	4.2	3.5	3.0	2.8	2.8	2.9	2.7	2.6	2.6	2.8	2.7
321	Textiles	12.6	11.8	10.8	9.8	10.0	10.2	10.3	10.3	8.8	9.2	9.2	10.0
322	Wearing apparel	2.7	3.9	3.3	2.9	2.9	3.0	3.0	2.9	2.5	2.8	2.3	2.3
323	Leather	1.4	1.1	1.0	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.6	0.7
324	Footwear	1.3	1.2	1.7	1.3	1.2	1.3	1.3	1.2	1.1	1.2	0.9	0.7
332	Furniture	1.9	1.7	1.5	1.5	1.5	1.4	1.4	1.5	1.3	1.6	1.3	1.3
342	Printing and publishing	2.6	3.1	2.4	2.6	2.6	2.5	2.6	2.7	2.2	2.3	2.3	2.2
361	Pottery, china and earthenware	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
390	Other manufactures	0.2	0.2	0.7	0.8	1.0	1.0	1.0	1.0	0.9	1.0	0.8	0.8
	Subtotal Group A	65.7	61.0	56.2	52.2	52.3	51.6	51.0	49.3	46.0	51.1	49.2	49.5
331	Wood and cork products	1.6	1.4	1.1	1.0	1.3	1.3	1.4	1.2	1.1	1.3	1.3	1.6
341	Paper and paper products	0.9	1.6	2.1	2.6	2.8	2.7	2.7	2.8	2.4	2.5	2.5	2.2
351	Industrial chemicals	1.5	1.6	1.8	2.0	2.2	2.2	2.5	2.6	2.5	2.7	2.7	3.3
352	Other chemical products	4.2	4.8	5.1	5.6	5.9	5.9	6.3	6.3	5.9	7.0	7.6	8.3
353	Petroleum refineries												
354	Miscellaneous products of petroleum and coal	12.0	12.9	14.9	13.1	11.5	12.1	10.7	12.0	16.4	7.1	8.5	3.8
355	Rubber products	1.4	1.9	1.9	1.9	2.1	2.1	2.1	2.0	2.5	2.0	2.6	2.8
356	Plastics	1.1	1.2	1.1	1.4	1.6	1.8	1.9	1.8	1.8	2.1	2.4	3.2
362	Glass and glass products	1.2	1.2	4.8	4.9	4.4	4.6	4.5	4.3	4.0	4.5	4.5	4.4
369	Other non-metallic mineral products	4.5	4.6										
371	Iron and steel	1.5	2.3	3.6	4.3	4.5	3.9	4.5	5.1	5.1	4.7	4.3	5.2
372	Non-ferrous metals												
	Subtotal Group B	29.9	33.4	36.4	36.8	36.4	36.7	36.6	38.1	41.8	33.9	36.5	34.8
381	Fabricated metal products	1.2	1.6	2.8	3.5	3.7	3.8	3.8	3.8	3.6	4.4	4.1	4.8
382	Machinery except electrical	0.8	0.9	1.3	1.9	1.8	1.9	2.2	2.2	2.1	2.6	2.7	3.6
383	Electrical machinery	1.0	1.0	1.3	2.1	2.6	2.7	2.9	2.9	3.0	3.7	3.7	4.1
384	Transport equipment	1.4	2.0	2.0	3.3	3.0	3.1	3.3	3.5	3.2	3.9	3.6	2.8
385	Professional equipment	-	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4	0.2	0.3
	Subtotal Group C	4.4	5.6	7.5	10.9	11.3	11.7	12.4	12.6	12.2	15.0	14.3	15.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Excluding Bolivia.
b/ Excluding Bolivia and Venezuela.
Source: ECLA. official statistics.

Table 13. Central American Common Market: structure of the manufacturing industries. 1960-1975
(percentages of value added)

ISIC	Industry	1960	1965	1970	1971	1972	1973	1974	1975
311-312, 313-314	Food, beverages and tobacco	57.9	49.7	45.9	46.2	45.8	45.4	44.2	44.8
321	Textiles	6.6	9.1	8.9	9.0	9.0	8.8	8.6	8.2
322-324	Wearing apparel and footwear	11.7	10.3	8.8	8.5	8.2	8.0	7.7	7.6
323	Leather	1.3	0.9	0.9	0.9	0.9	0.8	0.8	0.9
332	Furniture	2.9	2.4	2.3	2.1	2.0	2.0	2.2	2.2
342	Printing and publishing	2.0	2.1	2.0	2.0	2.0	1.9	2.0	2.1
390	Other manufactures	1.0	1.6	2.4	2.3	2.0	1.8	1.8	1.8
	Subtotal Group A	83.4	76.1	71.2	70.9	69.9	68.7	67.3	67.5
331	Wood and cork products	4.0	3.5	3.3	3.2	3.3	3.3	3.5	3.6
341	Paper and paper products	0.4	1.2	1.6	1.4	1.5	1.8	1.9	1.9
351-352, 356	Industrial chemicals, other chemicals and plastic products	3.9	5.4	5.9	5.9	6.3	6.4	6.4	6.4
353-354	Petroleum refineries and misc. products of petroleum and coal	-	1.8	3.1	3.6	4.0	4.3	4.7	4.9
355	Rubber products	0.8	0.9	1.1	1.0	1.0	1.0	1.0	1.1
361-362, 369	Manufacture of mon-metallic mineral products	3.4	4.5	4.1	4.1	4.1	4.5	4.9	4.8
371-372	Iron and steel and non-ferrous metals	0.1	0.3	0.4	0.4	0.5	0.5	0.6	0.7
	Subtotal Group B	12.6	17.6	19.5	19.6	20.7	21.8	23.0	23.3
381	Metal produets	1.2	3.1	4.8	4.8	4.9	5.0	5.0	4.6
382	Non-electrical machinery	0.7	1.1	1.2	1.3	1.2	1.2	1.2	1.1
383	Electrical machinery	0.3	0.7	1.7	1.7	1.7	1.8	1.9	1.8
384	Transport equipment	1.8	1.5	1.6	1.7	1.6	1.5	1.6	1.7
	Subtotal Group C	4.0	6.3	9.3	9.5	9.4	9.5	9.7	9.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ECLA. official statistics.

A comparison of the different three-digit ISIC product groups composing the metalworking sector indicates additional interesting features: fabricated metal products (ISIC 381) surprisingly contribute to the same extent to the value added in Brazil, the Andean Group and the CACM countries, i.e. around 4 per cent to 5 per cent in the mid-1970s. For the two groups of countries mentioned above, this product group contributed considerably to the growth of the sector. Product group 381 generally develops prior to others in the metalworking sector.

The construction of non-electrical machinery (ISIC 382) reached almost 9 per cent of industrial value added in Brazil in 1973 and fell back again, in accordance with the reduced growth of the manufacturing sector, to roughly 7 per cent in 1978. The Andean Pact countries have reached an intermediate stage with almost 4 per cent, whereas the Central American countries show hardly any development in this sector since 1960, its share oscillating around 1 per cent.

The strongest growth in Central America however from a very low level, is in electrical machinery and equipment (ISIC 383) increasing its share from 0.3 per cent in 1960 to 1.8 per cent in 1975. The corresponding figures for the Andean Pact countries are roughly twice as high: 3.7 per cent in 1975 and 4 per cent in 1977. The figure for Brazil was approximately 5.6 per cent in 1975 and 6 per cent in 1978. In other words, the Central American share in industrial value added of the electrical machinery and equipment sector in the mid-seventies corresponds approximately to the value of the Andean Pact countries of the mid-sixties and of Brazil in the late 1950s.

The most rapid development in Brazil was observed in the transport equipment sub-sector (ISIC 384) the share of which grew by a factor of 9 between 1955 and 1978 to achieve 11 per cent of industrial value added. The contribution of the transport industry to value added in the Andean Pact countries almost tripled from 1.4 per cent in 1950 to approximately 4 per cent in 1975, falling back to 2.8 per cent again in 1978 (in Venezuela alone, the share of this product group is above 5 per cent for the late 1970s). Yet in Central America the transport industry showed no upward development; it varied between 1.5 per cent and 1.8 per cent of manufacturing value added between 1960 and 1975.

Thus, the major contribution to Brazil's dynamic development in the metalworking industry comes from the transport industry, especially from the automotive sector. The Andean Pact countries also have developed an automotive industry going beyond assembling of passenger vehicles. However there have been some setbacks and constraints in this field. Due to the economies of scale, Central America will face major problems in developing its own passenger car industry with a considerable local content, a reason why different approaches to future development of the metalworking sector must be considered. Central America will have to look for production possibilities where economies of scale do not have the same limiting constraints as in passenger car construction. Considering the transport sector, the possibilities most probably will be limited to truck and bus assemblies, special transport equipment and railroad equipment (on a limited scale).

Scientific and measuring equipment (ISIC 385) is of no importance in Central America, contributing only 0.3 per cent to the industrial value added in the Andean pact countries and 0.7 per cent in Brazil. Its economic importance to this region is therefore far lower than its value in terms of technological progress.

2.3 The role of government in industrial development

Latin American governments have been active in four aspects of industrial development:

- industrial policy
- public entrepreneurship
- purchasing of industrial goods, especially capital goods
- international co-operation thorugh creation of regional markets.

Government activities in areas such as engineering and design are relatively scarce.

2.3.1 Industrial policy

In the last three decades, the economic policies of many Latin American countries were in effect essentially industrial policies. Some examples of important aspects of these policies are:

1) Fiscal policies such as tax holidays for newly established enterprises according to their perceived degree of importance to the government, and tax deductions for investments in special sectors or regions.

2) Policies affecting exchange rates: export bonuses for manufactured goods, duty reductions for imported raw materials or production equipment. It must be emphasized that their policies have sometimes had negative effects on the domestic production of the same goods.

3) Credit policies: investment credits for new industrial establishments, enlargement of production, and government purchasing contracts.

4) Promotion activities: export promotion, improvement of product quality, "buy national" activities and promotion of national production inputs.

5) Protectionism: import regulations, customs barriers, protection of local investors, etc.

6) Investment activities: investments in infrastructure, technical education, development banks and development programmes, and direct investment in industrial production.

7) Support activities: execution and dissemination of applied research, technical assistance, especially to small industries; administrative support through creation of special institutions or commissions such as national institutions for standards.

The interactions of state and industry, with or without direct interference by the state, are manifold. In recent years, especially in the countries in the southern part of the continent, the role of the state has been reduced considerably following the introduction of new economic policies. However, economic developments during the recession at the end of 1982 and the beginning of 1983 seem to indicate a new trend to return to the established policies of stimulating and guiding industrial development.

2.3.2 Government as entrepreneur

In general, the governments have limited themselves to the role of indirect agent in industrial investment and production. Yet almost every country has an exception whereby the state is owner of industrial enterprises. This is especially the case in basic industries, such as steel, petroleum and petrochemicals, important mining operations; and basic agro-industries, such as sugar production.

For example, in 1978 major steel production in Latin America was by state-owned enterprises in Argentina (69 per cent of total production), Mexico and Brazil (60 per cent), Chile (almost 100 per cent), Venezuela (80 per cent), and Peru (100 per cent). Petroleum refining and production of chemicals in the Andean Pact is state owned, as well as the refining in Mexico, Chile, Argentina and Brazil. Some or all of the subsequent steps in processing are also done by state enterprises.

Historically, the governments took over investment in basic industrial sectors which required industrial development and where private investment was either not available in the required magnitude or the return on investment was uncertain, or strategic considerations led the governments to invest themselves.

However, the governments have always limited their industrial activities to specific sectors and normally do not compete with private enterprises in the manufacturing sector. However, there are exceptions, for example when governments decide to take over financially weak companies to maintain existing employment opportunities.

2.3.3 Government purchasing power

Through their activities as entrepreneurs the governments are direct purchasers of capital goods, e.g. for basic steel and petroleum industries. The second area of purchasing by the state is in sectors demanding capital goods, such as transportation (mainly railroad equipment), electricity generation and distribution, telecommunication and, in some cases, mining.

These direct purchases can represent in some countries up to 60 per cent of the total market for capital goods. Thus, the purchasing policies of the governments can have an extremely strong influence on the performance of specific sectors of the capital goods industries.

2.3.4 International co-operation through creation of regional markets

Parallel to industrial development and complementary to the national industrial policies, the governments of Latin America co-operated in the creation of larger sales markets through regional economic treaties. In the late 1950s a regional customs agreement was conceived: LAFTA (Latin American Free Trade Area), including Mexico and the Latin American countries, Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay and Venezuela. This agreement is now called the Latin American Integration Association (ALADI).

In the beginning of the 1960s, the Central American Common Market, with Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua as members, was formed. Due to geographic reasons and assistance from common institutions such as the Central American Bank for Economic Integration, it was in certain ways more successful than LAFTA, but still could not overcome in many cases the limitations imposed by the lack of communication or by national political requirements.

The Caribbean Community was formed by the English-speaking countries of the Caribbean region, which were former British dependencies. Barbados, Guyana, Jamaica and Trinidad and Tobago were of central importance. Characteristic for this area are the relatively big distances between the islands and the relatively small size and number of inhabitants.

The late 1960s saw the creation of the Andean Pact by Bolivia, Chile, Colombia, Ecuador and Peru. Later Venezuela became a member and Chile resigned, so that the Andean Pact consists again of five member states. Its main aims go beyond customs regulations and exchange of products. Through balanced growth of its partners, regional distribution of planned industrial activities and new investments, it intends to achieve a common market area

from which each partner can profit. Its agreement on the metalworking industry will be treated later in this document.

The effectiveness of efforts towards regional economic co-operation have often been questioned. Yet further refinement of these efforts will most probably play an important role in future industrial strategies of the region.

2.4 The role of transnational corporations

The participation of transnational corporations in the manufacturing sector started to grow strongly in the middle of the 1960s, when investments shifted from exports in the primary sectors to the supply of local markets in the secondary sectors.

Investment benefits, tax holidays, special arrangements and big internal markets were among the main factors inducing foreign companies to invest in Latin America. Since production outlay was geared towards internal markets, the countries with a high demand were favoured, namely Argentina, Brazil, and Mexico.

In recent years a growing interest by the transnational corporations in export markets can be seen by their growing participation in the exports of manufactured products.

Table 14 shows the direct foreign investment in Latin America and the Carribean, giving the total figure and the share of the manufacturing industry for 1967 and 1976.[54/] The portion of the total investments going into the manufacturing sector is especially high in the large countries, decreasing in the medium-sized and small countries. In 1977 the manufacturing sector absorbed three-fourths of the total foreign investment in the three large countries, one-third in the medium-sized ones, one-fifth in the small countries and one-tenth in the even smaller Caribbean countries. All groups of countries except the Caribbean absorbed a higher portion of foreign investments in the manufacturing sector than in 1967. Even though the three large countries increased their total absorption of foreign investment between 1967 and 1975 by 11 percentage points (the medium-sized countries lost

Table 14. Direct foreign investment in Latin America and the Caribbean, 1967 and 1976

	1967					1976				
	In millions of $US		Share of the manufac-turing sector	Distribution in the region (%)		In millions of $US		Share of the manufac-turing sector	Distribution in the region (%)	
	Total	Manufac-turing sector		Total	Manufac-turing sector	Total	Manufac-turing sector		Total	Manufac-turing sector
Latin American countries										
Large countries	7,336	5,014	68.3	48.1	81.1	16,000	12,000	75.0	59.0	79.0
Argentina	1,821	1,201	66.0	11.9	19.4	2,250	1,500	66.7	8.3	9.9
Brazil	3,728	2,526	67.8	24.4	40.9	9,100	6,900	75.8	33.6	45.4
Mexico	1,787	1,287	72.0	11.7	20.8	4,650	3,600	77.4	17.1	25.7
Medium sized countries	5,968	864	14.5	39.1	14.0	6,360	2,350	36.6	25.5	15.4
Colombia	728	238	32.7	4.8	3.9	1,250	850	68.0	4.6	5.6
Chile	963	93	9.7	6.3	1.5	410	150	36.6	1.5	1.0
Peru	782	142	18.2	5.1	2.3	1,800	330	18.3	6.6	2.2
Venezuela	3,495	391	11.2	22.9	6.3	2,900	1,000	34.5	10.7	6.6
Small countries	1,946	303	15.6	12.8	4.9	4,750	853	18.0	17.5	5.6
CACM[a]/	601	114	19.0	3.9	1.8	970	350	36.1	3.6	2.3
Others[b]/	1,345	189	14.1	8.8	3.1	3,780	503	13.3	13.9	3.3
Total (19 countries)	15,250	6,181	40.5	100.0	100.0	27,110	15,183	56.0	100.0	100.0
Caribbean countries[c]/	4,157	660	15.9	27.3	10.7	10,630	1,130	10.6	39.2	7.4
Grand total	19,407	7,341	37.8	127.3	110.7	37,740	16,313	43.2	139.2	107.4

a/ Central American Common Market.
b/ Bolivia, Ecuador, Panama, Paraguay, Uruguay, Haiti and Dominican Republic.
c/ Barbados, Guyana, Jamaica, Suriname, Trinidad and Tobago, Bahamas, Bermuda and the Associated States of the West Indies.

this share plus approximately 5 percentage points to the benefit of the small Latin American countries), the share in the manufacturing sector of the three large nations declined by 2 percentage points. This was due to the sharp reduction for Argentina (by 9 points) which the increase of Brazil (4 points) and Mexico (3 points) could not balance. Regional participation in investment in the manufacturing sector of the medium- and small-sized Latin American countries increased in the same period by approximately 1 percentage point each, whereas the Caribbean shows a loss of 3 points. Thus, these groups seem to be able to attract more capital for investment in the manufacturing sector, although at a relatively low share of total investment compared to the big countries. In 1977 total foreign investment increased to US$ 31,790 million for the 19 Latin American countries, i.e., an increase of 17 per cent from 1976.[56/] This increase was especially beneficial to the manufacturing sector of the small- and medium-sized countries.

The growing importance of the medium-sized and small Latin American countries is also shown in analyzing the growth in investments in the manufacturing sector: total foreign direct investment in 19 Latin American countries grew from US$ 6.2 in 1967 to US$ 15.2 billion, i.e. 146 per cent, as compared to 78 per cent for total foreign investment, i.e. from US$ 15.25 to US$ 27.1 billion. In the large countries this investment in manufacturing grew from US$ 5.0 to US$ 12.0 billion (140 per cent), in the medium-sized countries by 170 per cent and in the small countries by 182 per cent. The Caribbean had a growth of 71 per cent.

The contribution to manufactured GDP of the foreign enterprises represented 16 per cent in 1966 and 19 per cent in 19 Latin American countries in 1975. While manufactured GDP grew by 7 per cent in these 10 years, the part generated by foreign companies grew by 9 per cent. This partly reflects the fact that transnational corporations select those sectors of manufacturing activities which have above-average growth rates. For example, in Brazil's non-electrical machinery sector, with an annual growth rage of 16 per cent, transnationals had a 75 per cent market share. In Brazil's transport sector with an annual growth of 15 per cent, transnationals had a 94 per cent market share.

Statistical data on the participation of the transnational corporations in exports are scarce. In 1975, 94 per cent of goods manufactured in Latin America by transnational corporations based in the United States were sold on the local market, 6 per cent were exported.[56/] Yet there are great differences by sector and by country. For example, the export share in metal products, machinery and equipment of transnational corporations was approximately 36 per cent. In Brazil in 1976, the transnationals accounted for approximately 95 per cent of exports of transport equipment and 71 per cent of electric machinery. In Argentina, their export share in manufactured products was 42 per cent in 1973.[54/]

2.4.1 The case of Brazil

ECLA is preparing a series of country analyses on the transnational corporations. The first one concerns Brazil.[76/]

The transnational corporations in Brazil have a production share of 46 per cent in the capital goods sector and 56 per cent in durable consumer products, both far above intermediate products (35 per cent) and non-durable consumer goods (16 per cent).

Table 15 indicates that transnationals in the capital goods sector account for 41 per cent of all transnational investment in manufacturing industries in Brazil and 34.5 per cent of the number of transnationals. This indicates the relative high investment per enterprise in this sector and/or the relative large size of each establishment. This is especially the case for transport equipment and also to some extent for electrical equipment and telecommunications. In both cases the ten largest companies account for more than half of the transnational sales volume (approximately 60 per cent for electrical and telecommunication equipment and 82 per cent for transport equipment). Yet in mechanical equipment the ten largest transnational enterprises only reach 48 per cent of sales of all transnational enterprises of this product group, and the ratio between the share in number of enterprises versus the share in investment is almost the reverse of that for transport equipment. Consequently, the average investment per enterprise

Table 15. Brazil: Transnational corporations investment and sales of capital goods, 1977

	Number of companies	%	Investment ($US million)	%	Investment per TNC ($US million)	Share in total TNC sales of 10 largest enterprises %
Mechanical engineering	106	16.4	825	8.1	7,8	48.1
Electrical equipment and telecommunications	71	11.0	1,639	16.0	23,1	59.6
Transport equipment	46	7.1	1,726	16.9	35,5	82.1
Total capital goods sector	223	34.5	4,190	41.0	18,8	63.3
Total for manufacturing industry	647	100.0	10,217	100.0	15,8	62.5

is only approximately one-fifth of that for the transport sector or approximately one-third of that for electrical equipment. Due to the relatively high number of enterprises it can also be deduced that the product range in this sector should be quite diversified.

In summary, the three selected product groups absorbed 41 per cent of foreign direct investment in the Brazilian manufacturing sector and a little more than one-third of the number of enterprises. Adding the investments in non-metallic mineral production (5.5 per cent), metallurgy (10.5 per cent), chemistry (14.5 per cent), food (6.6 per cent) and pharmaceuticals (2.5 per cent), one arrives at a share of these preferred investment sectors of 80.2 per cent, i.e. more than three-fourths of the total manufacturing foreign investment concentrates on eight product groups. Figures for Mexico show the same characteristics.

Table 16 gives production and employment comparisons of different types of enterprises. With the exception of transport equipment, the transnational enterprises have a higher share in production than in employment compared to national enterprises, state or privately owned. This means that their output value per employee is higher than in the nationally owned enterprises, most probably because of higher investment per employee, but perhaps also due to other factors (e.g. organization, subcontracting, specialization). Due to lack of information on these topics these questions remained unanswered.

Table 16. Brazil: Production and employment shares of enterprises with different ownership in selected sectors, 1977 (per cent)

Sector	Product share				Employment share			
	TE	SE	PE	Total	TE	SE	PE	Total
Mechanical industry	34	2	64	100	25	2	73	100
Electrical equipment and telecommunications	83	-	17	100	68	-	32	100
Transport equipment	78	3	19	100	81	3	16	100

TE = Transnational enterprise.
SE = State-owned enterprise.
PE = Privately-owned national enterprise.

Table 17 shows the distribution of sales among companies with foreign ownership. It shows that companies owned almost exclusively (95 per cent or more) by foreigners have a share in sales of 50 per cent or more. The minority ownership has a sales share of 8 per cent or less, an indication of the preference of transnational corporations to produce through subsidiaries instead of joint ventures.

Table 17. Brazil: Distribution of sales among companies in selected sectors with foreign participation, 1977 (per cent)

Sectors	Degree of foreign ownership				
	25 - 50	50 - 75	75 - 95	95	Total
Mechanical industry	7.1	29.6	5.9	57.4	100.0
Electric equipment and telecommunications	4.5	26.2	13.6	55.7	100.0
Transport equipment	1.5	10.1	37.9	49.5	100.0
Total of manufacturing industries	8.0	24.5	15.7	51.8	100.0

2.5 Education and training

Part of the industrial development observed in Latin America is due to the abundant availability of manpower and the efforts of the governments in the field of scientific, technical and vocational education and in training. The high quality of human resources has contributed impressively to industrial growth, specifically to the growth of the capital goods industry. Yet at the same time there seem to be indications that for the next phase of development of the capital goods industry, the basic engineering capacity might not be sufficient.

Data, analyses and suggestions for additional government action in the area of education and training are not available. The importance of the subject for the development of the capital goods industry merits its own independent analytical report, covering especially the question of how much the availability of qualified human resources influenced investment decisions in the capital goods sector.

3. PAST AND PRESENT SITUATION AND FUTURE TRENDS OF THE CAPITAL GOODS SECTOR

3.1 Production

Statistical records on production, especially on a product or product-sector basis, are incomplete in Latin America and homogeneous statistical records are not available.

In this section, the production capacities of the three large countries Argentina, Brazil and Mexico are not considered. It can be assumed that their production and engineering capacities are sufficient to produce the majority of capital goods needed to meet the considerable demand in the near future.

As stated above, the countries with capital goods industries less developed than those of Argentina, Brazil and Mexico will require more efforts and promotional and supporting activities to achieve a level of production which will enable them to produce a greater share of their own requirements in capital goods and to actively participate in intraregional trade. Therefore special attention will be paid to their production capacities.

According to the available information, which is not complete for all countries, the following production picture can be drawn for Latin American countries except Argentina, Brazil, Mexico, on selected product groups.

3.1.1 General metal and boiler shop production

Venezuela has the most modern and capable production equipment. The investments in the production capacities of structures and boilermaking have been considerable in recent years, mainly due to increasing domestic demand in the petroleum and petrochemical sectors. These investments mainly went into equipment for cutting, bending, rolling, welding, quality control and internal handling and, to a lesser degree, into heavy-fabricating machinery. Venezuela is capable of producing watertube boilers used in thermal power plants. It also produces seamless tubes with diameters between 2 3/8 inches and 24 inches. The installed capacity is 150,000 tpa. For tubes with seams up to 20

inches in diameter the installed capacity is 300,000 tpa, and for tubes with heliocoidal seams up to 80 inches in diameter the capacity is 180,000 tpa. Furthermore, Venezuela produces a range of forged products among which are flanges according to APT, ASTP-A-105 and A-181, grades I and II for pressures of 150, 300, 600 and 900 psi, and nominal diameters of 1/2 inch to 24 inches of the types welding neck, slip-on and others, as well as weldable connections from 1/2 inch to 48 inches and couplings for screwed tube unions used in the petroleum industry of diameters from 2 3/8 inches to 13 3/8 inches. Apart from that, it has a production capacity of valves of 2,000 tons per annum.

Colombia can be considered to be the most traditional in this product group, but the production equipment does not have the same capacity and is not as new as in Venezuela. Nevertheless Colombia exports boilers, even to industrialized countries. Its production extends to boilers of 150 MW, 2,000 psi and 500° C. The domes and other special elements are imported.

Colombia also produces valves with a capacity of 300 tons per annum and a series of flanges (ASTM, A 105 and A - 181, grades I and II) for pressures up to 600 psi.

Peru has special experience in boilermaking for the mining sector, yet the equipment installed in different companies for heavy steel structures and boilers limits the production capacity due to its advanced age. It also has some capacity to produce watertube boilers. The installed capacity for valves is unknown.

Ecuador, similar to Venezuela, receives its major impetus for local production from the petroleum industry.

Chile's installations are geographically dispersed and antiquated but the industry is still able to supply a good portion of the demand from the various sectors. The installed capacity to produce tubes with longitudinal seams up to 12 inches diameter is 20,000 tons per annum. The capacity to produce valves is unknown.

No data on Cuba were available at ECLA, yet it can be concluded from other indicators, e.g. well developed cement and sugar industries, that the capacity exists to meet the internal demand. An analysis of the capital goods sector was recently performed but has not yet been published.

The production equipment of Bolivia is outdated, but a good portion of local demand is met.

According to a recent industrial master plan, 83/ Paraguay's metalworking industry employs roughly 14,000 people in approximately 1,200 enterprises and workshops, which grew at an average rate of 11 per cent annually between 1975 and 1979. There are several small enterprises and workshops which produce boilers and structured steel and aluminium products. For example, one company produces tanks for the petroleum industry, as well as for water supply and agricultural uses. Its production is limited by the fact that no preference is given to local purchases when industrial development credits are granted. Another enterprise, employing roughly 300 people, produces gates, grills, pressure tubes and similar products for the Itaipú hydroelectric plant. This company is the most modern of the metalworking branch in Paraguay with investments of approximately $US 16 million and produces roughly 60 different types of heavy equipment and machinery, e.g. for steel plates rolled up to a thickness of 75 mm, torches cutting up to a thickness of 300 mm, a hydraulic press of 2,000 t and lathes with 6 m working length. Apparently this enterprise will also participate in the construction of the second largest bilateral hydropower plant in Yaciretá, which will be built with Argentina. This project, based on major engineering works, is an example of the possibilities existing in countries which are in this particular stage of development of the capital goods industry.

Uruguay also has a long tradition in the metalworking industry, but a reduction in its market has prevented the development of a broad industrial base. There are a good number of enterprises that produce structures, pressure tanks, boilers and heat exchangers, even though the installed equipment needs to be modernized. Uruguay has experience in the construction of watertube boilers used in thermal power plants. It also has a small production of seamless tubes (capacity unknown).

Data on Central America are scarce. Their structural metal and boiler industry is at an incipient stage. Installations for the most part have a capacity to produce steel plates with a thickness of less than one inch. Products mainly for the building and sugar industries (evaporaters, juice concentrators, condensers, pans, etc.) are fabricated. Three enterprises have a machining capacity range up to 10 tons per cast piece of crushing rolls with a diameter of 1 meter and a length of 2.1 meters on lathes with a width of 6 meters between points capable of supporting pieces up to 20 tons in weight.

In the Dominican Republic there are approximately 50 enterprises (not including small enterprises) in the metalworking sector, with a total of approximately 3,100 employees. The total production value and value added are represented in table 18. According to latest available date, the most important product group is metal products, with 70 per cent of production value in 1977; one-third of this amount is attributed to the production of cans for food.

Table 18. Production value and value added of the metalworking industry in the Dominican Republic

	Production value (millions of $US)		Value added (millions of $US)		Value added (% of production value)
	1972	1977	1972	1977	1977
Metal products	22,7	52,4	10,26	17,24	32.9
Non-electrical machinery	2,0	8,7	0,25	3,32	38.2
Electrical machinery and apparatus	4,2	12,5	1,36	3,2	25.6
Transport equipment	-	0,1	-	0,04	40.0
Scientific instruments	0,3	1,0	0,07	0,45	45.0
Total	29,2	74,7	11,94	24,25	32.5

Source: GTZ, Dominikanische Republik-Subsektorstudie über Maschinen und Geräte für die Landwirtschaft.

Four enterprises are active in the field of metal structures. Their installed capacity is approximately 350 tons of steel per month per shift. At the moment their capacity utilization is down by approximately 25 per cent and their work force has been reduced from a normal level of 500 employees to around 120. One enterprise is relatively integrated, i.e. it has four electric steel smelters with a capacity of 60 tons per charge, giving an annual capacity of 108,000 tons (60 tons per charge, 6 charges per day, 300 days per year). Its steel rolling capacity for strips, squares, angles, construction steel and wire rod is approximately 95,000 tons per annum, including a capacity to manufacture tubes up to 3 inches in diameter.

Two enterprises produce stainless steel and other metal products, according to specification, for the pharmaceutical and food industries, e.g. a brewery has recently been built by one of the companies. They employ approximately 80 people. Discontinous income from orders does not allow a stable employment scheme nor a capacity-utilization programme. There is an installed capacity for producing gas bottles, water reservoirs, silos and mobile tanks for trucks. One enterprise producing tubes for hydroelectric installations has discontinued its operation due to lack of orders.

Table 19 summarizes estimates of the production capacity of boiler shops in some countries, table 20 gives the estimated annual production capacity of selected products and table 21 provides an indication on quoted or constructed oil and gas storage tanks.

With respect to a single demand sub-sector, such as the sugar industry, Latin America is capable of supplying all machinery and equipment needed.[86/] This is also the case for harvesting equipment for this sub-sector. The main producers of equipment for the sugar industry are Argentina, Brazil, Cuba and Mexico. Colombia and Peru have limited production capacity; the other countries only possess certain capacities for maintenance and repair of field and factory equipment.

Engineering companies for the sugar sector are also well established in the region to the extent that a generally advanced stage has been reached for the development, design and production of capital goods for the sugar industry.

Table 19. Production capacity of boiler shops in selected Latin American countries

	Cold rolled plates[a/] (maximum thickness)	Far ends and headstocks (maximum diameter and thickness)	Lifting capacity of cranes and tackles (tons)	Tension relief furnace
Bolivia	19 mm (3/4")	2.5 m x 5/8"	10	
Chile	50 mm	4.0 m x 7/8"	55	4.0 x 5.0 x 20.0 (750° C)
Colombia	60 mm (2.3/8")	4.5 m x 1.1/2"	120	5.6 x 5.6 x 23.0
Dominican Republic[b/]	32 mm (1 1/4")	...	30	3.0 x 2.5 x 10.0
Ecuador	45 mm (1.3/4")	3.0 m x 1.1/2"	30	-
Guatemala	19 mm (3/4")	2.5 m x 5/8"	10	-
Paraguay	77 mm (3")	...	60	6.0 x 4.0 x 10.0 (950° C)
Peru	50 mm (2")	4.0 m x 1.1/2"	60	6.0 x 5.0 x 8.5
Uruguay	19 mm (3/4")	...	20	2.5 x 2.5 x 10.5
Venezuela	75 mm (3")	5.0 m x 1.1/2"	200	6.5 x 6.5 x 18.0 (959° C)

a/ Plates 3 m wide, in cases of Paraguay and Venezuela 4 m wide.

b/ Producers' information.

Table 20. Estimated production capacity for boilers and structural products in selected Latin American countries (tons per annum)

Country	Metal structures	Storage tanks and conduits	Pressure recipients	Heat exchangers	Total
Bolivia	2,000	1,000	500	-	3,500
Central America	4,000	2,000	500	-	6,500
Chile	18,000	15,000[a/]	3,000	1,000	44,000
Colombia	2,000	1,000	500	-	3,500
Dominican Republic[b/]	4,200	1,500	800	200 disc.	6,700
Ecuador	6,000	8,000	2,500	500	17,000
Paraguay	...	...	...	...	...
Peru	12,000	10,000	4,000	2,000	28,000
Uruguay	...	...	...	...	...
Venezuela	65,000	30,000	20,000	12,500	127,500

a/ Including existing capacity in the steel plant of Compañía de Acero del Pacífico of 5,000 tons per annum.

b/ Estimates based on information from producers.

Table 21. Quoted or constructed storage tanks for oil or gas in Central and South America

Country	Tanks with floating tops (barrels)	Horizontal recipients for propane (gallons)
Central America	50,000 (fixed top)	
South America		
Chile	50,000	50,000
Colombia	500,000	50,000[a/]
Ecuador	300,000	30,000
Peru	500,000	50,000
Venezuela	1,000,000	80,000[a/]

a/ Criogenic.

3.1.2 General equipment for general application

Colombia produces pistons and rotating air compressors. Annual production capacity for centrifugal pumps of up to 22,000 l/min is up to 25,000 units per year. The data on production of axial and centrifugal ventilators as well as speed reducers is not available. Cranes can be produced with lifting capacities up to 200 tons.

In Chile the production of compressors with capacities up to 4,100 litres per minutes has now been discontinued. The capacity to produce pumps and ventilators (up to 3,000 m^3 per minute) is unknown. Cranes can be produced with capacities up to 200 tons lifting capacity.

Ecuador can produce ventilators with capacities up to 600 m^3 per minute and cranes with lifting capacities of 40 tons.

Peru can produce compressors with capacities up to 5,500 litres per minute, 1,200 units per year, and approximately 10,000 units per year of centrifugal and horizontal pumps with capacities up to 90,000 litres per minute for pulp and 11,500 litres per minute for sand. Data on installed capacities to produce speed reducers, ventilators (with capacities up to 3,800 m^3 per minute) and cranes (capacities up to 40 tons) is unavailable.

Venezuela can produce compressors with capacities up to 4,100 litres per minute, 500 units per year. The production capacities are unknown for centrifugal pumps, speed reducers, ventilators and cranes up to a lifting capacity of 750 tons.

The Andean Pact, under its industrial programme, has assigned the production of air compressors, exclusively to Brazil. Production started in 1979, but production levels are still low. Brazil can also produce horizontal pumps (5,000 units per year) and ventilators (capacities up to 600 m^3 per minute, capacity unknown).

Uruguay produces only centrifugal pumps.

The Dominican Republic produces tanks for air compressors on the basis of customer orders. Quotes have also been given for air compressor tanks for export.

3.1.3 Agricultural machinery and equipment

From 1960 to 1976 the agricultural machinery and implements industry in Latin American countries experienced a self-sustained development with high levels of growth. From 1962 to 1976, production in the tractor industry increased from 18,567 units in the first year to 100,951 units in 1976, which represented an average rate of growth of 12.9 per cent. Similarly the production of agricultural machinery and implements other than tractors grew at an average of 7.0 per cent yearly in the same period.

Between 1976 and 1982, the production level fell as a consequence of international economic development and in some countries also because of internal problems. The production of tractors measured in units produced

decreased at an average rate of 10.8 per cent yearly; the other components in this branch decreased at an average of 9.2 per cent yearly, in both cases (see table 22).

Table 22. Production of agricultural machinery and implements in Latin America, selected years (units)

Items	1962	1967	1970	1976	1980	1982
Tractors (more than 10 HP)						
Argentina	10,981	9,664	10,642	24,098	3,658	3,889
Brazil	7,586	6,219	14,029	65,279	57,975	32,246
Mexico	-	3,592	4,116	11,574	16,495	14,528
Total	18,567	19,475	28,787	100,951	78,128	50,663
Agricultural machinery and implements other than tractors	137,960	212,812	469,328	354,612	217,025	198,000

Source: UNIDO, "A Survey of the Latin American Agricultural Machinery Industry", Sectoral Studies Series No. 6, IS/407, p.3.

Total production of agricultural machinery developed as shown in table 23. The share of tractors in total production has, with the exception of 1975, remained relatively stable around 57 per cent in all of the years reviewed.

Table 23. Production of agricultural machinery in various Latin American countries,[a/] 1974-1978 (millions of $US)

Years	Tractors	Total production of agricultural machinery
1974	528	926
1975	946	1,160
1976	807	1,416
1977	764	1,340
1978	629	1,103

a/ Argentina, Brazil, Colombia, Ecuador, Mexico, Peru and Venezuela.

In 1974 the output of agricultural machinery amounted to around one billion United States dollars, in the three largest countries in Latin America (Argentina, Brazil and Mexico) and four countries of the Andean Pact (Colombia, Ecuador, Peru and Venezuela), amounting to 90 per cent of the agricultural machinery manufactured in the region. This figure would not be much higher were it to include the output of the remaining countries of the region (because in most of these countries this industry is at a relatively low level of development).

The tractor industry represents the most important component of the agricultural machinery and implements output in Latin America. Tractors accounted for 57 per cent of the agricultural machinery produced in Argentina, 64 per cent in Brazil and 69 per cent in Mexico. The information available on production of other agricultural machinery is incomplete. However, despite the different levels of development reached in this sector, almost all countries in the region manufacture some agricultural equipment, such as simple hand tools and some animal-drawn equipment.

(a) Manufacture of tractors

Table 24 gives figures for the production of tractors of over 10 HP in the selected countries of the region during the period 1970-1982. The production grew steadily at an average annual rate of growth of 23.6 per cent between 1970 and 1976. In 1977 the production decreased to 89,816 and in 1982 to 50,663 units (the production level reached in 1972).

(b) Manufacture of other agricultural machinery and implements

Other agricultural machinery and implements are manufactured in limited quantities by small- and medium-sized enterprises and by craftsmen, often in rural repair shops. The relatively simple manufacture of many tools and the advantages of being located near the market have meant that the majority of these small manufacturers are established in agricultural areas and, accordingly, more widely scattered than is usual in other branches of industry.

Table 24. Production of agricultural tractors of more than 10 horsepower in Argentina, Brazil and Mexico, 1970-1982
(units)

Year	Argentina	Brazil	Mexico	Totals
1970	10,642	14,029	4,116	28,787
1971	13,268	23,548	5,079	41,895
1972	14,408	31,438	6,229	52,075
1973	21,460	41,513	5,830	68,803
1974	24,505	49,075	7,539	81,119
1975	18,397	58,061	10,082	86,540
1976	24,098	65,279	11,574	100,951
1977	25,631	53,696	10,489	89,816
1978	5,997	49,474	13,005	68,476
1979	10,901	56,418	15,500	82,819
1980	3,658	57,975	16,795	78,128
1981	1,378	42,474	18,980	62,832
1982	3,889	32,246	14,528	50,663

Source: UNIDO/IS 407, op. cit., p.10.

Production of tools for preparing the soil, sowing and cultivating, such as ploughs, rakes, seed drills, cultivators, harrows, fertilizer dispensers etc., is also quite widespread. Products of this type are made not only in Argentina, Brazil and Mexico, but also in Chile, Colombia, Ecuador, Peru, Uruguay and Venezuela.

The economic difficulties during 1981 and 1982 were responsible for the decrease in the production and sales levels of the agricultural machinery sector. In addition, the tractor industry is working at a very low level of capacity utilization of only 30 per cent. In 1983, tractor production in Argentina, Brazil and Mexico increased compared to production and sales in 1982. Argentina increased its production by 75 per cent in the first quarter of 1983 compared to the same period in 1982.

In 1982 the total tractor fleet in Latin America was 874,189 units. The big countries of the region (Argentina, Brazil and Mexico) had 70.5 per cent of the tractor stock of the region or 616,700 units.

As far as harvesting equipment is concerned, the situation is rather different because the technology is more complex. The main producer of self-propelled harvesters is Argentina, but Brazil also produces this type of machinery. Chile, Colombia and Mexico have some stationary threshing machines. The harvester-thresher fleet in Latin America was 128,723 units and Argentina, Brazil and Mexico had a fleet of this equipment of 95,000 units, or 73.8 per cent of the region: 44,000 units in Argentina, 36,000 units in Brazil and 15,000 units in Mexico.

In the mid-1970s, the share of local production in the apparent consumption of agricultural machinery was over 90 per cent in Argentina, more than two-thirds in Brazil and more than 50 per cent in Mexico which means that production had already more importance for meeting local demand than imports. The growth potential for local production in the Andean Pact countries is still considerable; only 31 per cent of the market is covered by local production in Colombia, in Peru this share is 21 per cent, for Venezuela 11 per cent and Ecuador 4 per cent.

3.1.4 Electrical machinery and equipment

Available data on production capacity in selected Latin American countries are shown in Table 25. Distribution transformers and switchboards are also produced in the Dominican Republic, yet the technology needs to be improved so that better product quality and competitive production costs can be achieved.

Distribution transformers are produced in Colombia, Chile, and Peru, as well as sub-stations and distribution panels up to 3 000 KVA. Bolivia, the Dominican Republic, Uruguay, Ecuador and the countries of Central America also produce distribution transformers up to 1 500 KVA.

Table 25. Production capacity of electrical motors and power transformers in selected Latin American countries

Country	Single phase (HP)	Three phases (HP)	Production capacity (units)	Power transformers KVA/KV	Production capacity MVA
Chile		up to 50	10,000	50,000/166	600
Colombia	1/4 - 3	1/3 - 30	70,000	10,000/35	15
Peru	1/10 - 1 1/2	1/3 - 310 (naval use)	60,000	50,000/154	1,000
Venezuela	1/4 - 5	1/4 - 50	-	10,000/35	-

3.1.5 Railroad equipment

Production and exports of freight and passenger cars have a tradition in some Latin American countries, for example exports from Chile to Bolivia, Venezuela, Peru and Canada. Table 26 summarizes the production capacity of freight cars and carts in Chile, Colombia and Peru. However, the capacity in most countries is often unused to a considerable extent. Experts consider that the capacity utilization could be quickly improved if corresponding orders would come in. Although detailed information was not available, Bolivia, Costa Rica, Ecuador, Mexico, Paraguay and Uruguay have installed capacities to produce railroad parts and overhaul rolling material.

3.1.6 Mining equipment

Mining and the required equipment have been a traditional activity in many Latin American countries. However technological development of local products has not kept pace with international trends. Therefore, imports of mining equipment have generally over-run local production.

The capacity to supply mining equipment is best developed in Chile and Peru. The latter has produced the major part of equipment for an enrichment plant for minerals, with a capacity of 500 tons per day. Among the produced items are:

Table 26. Production capacity for railroad freight cars and parts in Chile, Colombia and Peru

Product	Chile		Colombia		Peru	
	Capacity per year	National integration (%)	Capacity per year	National integration (%)	Capacity per year	National integration (%)
Freight cars	240	68	480	44	200	44
Bogies	480	77				
Welded plate Chassis and crosspieces	480	60				
Welded plate Wheels and axes						
Forged wheels for railroad cars	27 000	100				
Rims	27 000	100				
Axes	a/	100				
Cast iron Break shoes	a/	100	a/	100	a/	100
Central plates	a/	100	a/	100	a/	100
Helocoidal springs	3 000 t	50				
Frames and upper works b/	240	63	480	63	200	63
Frames and upper works c/	240	80	480	80	200	80
Steel cast pieces	a/	100	a/	100	a/	100

a/ Production capacity undetermined.

b/ Including break equipment, couplings and shock absorber system.

c/ Without break equipment, couplings and shock absorber system.

- jaw crushers, single and double acting up to 16" x 26"
- roller crushers up to 24" x 24"
- conical crusher up to 3 feet
- single, double or triple vibrating screens up to 6' x 14'
- spiral classifiers up to 78 inches in diameter
- flotation bins of various sizes and characteristics
- ball mills and bar mills up to 13 feet in diameter
- disk filter up to 10 1/2 inches in diameter and with filter areas up to 2,400 sq ft
- mining carriages with content capacities up to 180 cubic feet
- feeder for dry reagents up to 84 inches in diameter
- rotary screens up to 8 feet in diameter
- plate and chain feeder up to 84 inches
- rotary dryer up to 100 inches wide and 12 feet in diameter
- grid classifiers
- hammer mills
- hydrocyclones and thickeners

Peru's total installed production capacity is approximately 3,000 tons per annum.

Chile has a production range similar to Peru. However data on capacities are not readily available.

Bolivia produces hydrocyclones, small crushers, flotations bins and ball mills up to 6 feet.

Colombia has a limited production capacity, concentrating on equipment for coal and gold mines.

It is worth mentioning that there is production capacity for forged or cast iron parts such as milling balls, or for earth-moving equipment. The capacities in thousand tons per annum in the mining industry is as follows:

Bolivia	2	Peru	45
Chile	18	Venezuela	20
Colombia	20		

There are 19 foundries in the Dominican Republic producing approximately 6,700 tons of cast products valued at approximately US$ 7 million per annum (see table 27). Approximately 90 per cent are cast iron. The remaining 10 per cent is divided almost evenly between aluminium and bronze. The value added corresponding to the production is 45 per cent, approximately US$ 3.2 million. These 19 foundries can be classified into three groups:

- One modern and newly equipped foundry, owned by a transnational corporation. This foundry produces a great variety of technically difficult products, such as sugar cane rolls (approximately 10 tons per piece) and cleaning combs (approximately 0.7 t per piece), applying the Melhanite-process.
- Three to five medium-sized foundries.
- Approximately 12-15 small-scale industries, some of them operating discontinuously and serving the local households.

The sugar industry is the most important consumer for the foundries, demanding approximately 3,250 tons of grey iron and 210 tons of bronze. Together with 650 tons of imports this represented a total demand of 4,110 tons in 1979. 85/

Table 27. Output of foundries in the Dominican Republic in 1979

	Quantity		Value	
	tons	(%)	(millions of $US)	(%)
Pipes and fittings	525	7.9	0.31	4.5
Castings for sewer	945	14.2	0.57	8.3
Castings for stoves etc.	360	5.4	0.21	3.0
Parts for railcars	120	1.8	0.30	4.3
Parts for sugar factories	3,460	51.9	4.10	59.1
Parts for other machinery	890	13.3	0.,75	10.8
Household goods	340	5.1	0.55	7.9
Art castings	30	0.4	0.15	2.1

Source: GTZ, Dominikanische Republik-Subsektorstudie über Giesserei und Schmiedeprodukte.

3.2 Trade

3.2.1 Imports

Table 28 shows the imports of capital goods into Latin American countries from 1976 to 1981. Very remarkable are the increases in imports of Mexico which more than tripled from 1978 to 1981 and Peru which show annual imports more than tripling in the same period; other countries with development worth mentioning are Uruguay and Nicaragua which roughly doubled their imports and El Salvador which shows a sharp decline in 1981 to approximately one-third of its 1978 value.

Table 28. Capital goods imports by 19 Latin American countries (millions of $US, current cif prices)

	1978	1979	1980	1981
Argentina	1,384	1,568	2,392	1,800
Bolivia	365	423	367	381
Brazil	3,552	3,775	4,381	4,020
Colombia	1,557	1,669	1,564	2,172
Costa Rica	281	347	282	219
Chile	841	946	1,274	1,440
Ecuador	827	598	608	591
El Salvador	268	207	121	92
Guatemala	363	338	286	300
Haiti	43	54	63	36
Honduras	230	247	300	255
Mexico	1,981	3,577	5,032	7,190
Nicaragua	113	46	110	209
Panama	125	150	188	204
Paraguay	107	136	156	161
Peru	458	693	1,126	1,547
Dominican Republic	216	227	276	300
Uruguay	106	174	276	229
Venezuela	4,739	4,254	4,447	5,000 a/
Total	17,456	19,430	23,649	26,146

a/ Estimated.

Source: Division of Statistics, ECLA, 1981 economic study.

3.2.2 Exports

Table 29 provides export figures for selected Latin American countries in 1980. The predominance of capital goods exports by Brazil (approximately 72 per cent of total capital goods exports of the selected group of countries in 1980) is striking. The three big countries Argentina, Brazil and Mexico account for 95 per cent of exports.

Colombia's exports to ALADI countries amounts to 80 per cent of its exports; a more detailed disaggregation of its figures would most probably show that most of these exports go to the Andean Pact countries, which form part of ALADI. The low share of Mexico (approximately 17 per cent) shows its relatively minor integration into ALADI, its main customers being the United States of America and Central America. Argentina exports approximately two-thirds of its capital goods to ALADI countries. Brazil has been successful in penetrating additional markets outside of Latin America since its exports to the ALADI countries are less than half of its total exports of capital goods.

Table 29. Exports of capital goods by selected Latin American countries, 1980

	Total (millions of $US)	Percentage	Exports to ALADI countries (millions of $US)	Percentage	Percentage ratio of total exports to ALADI
Argentina	428.2	12.7	270.9	18.1	63.3
Brazil	2417.3	71.7	1085.9	72.4	44.9
Chile	65.0	1.9	15.3	1	23.3
Colombia	66.6	2	52.2	3.5	79.1
Mexico	359.7	10.7	61.6	4.1	17.1
Venezuela	35.2	1	14.2	0.9	40.3
Total	3372.0	100	1500.1	100	44.5

Source: Division of statistics, ECLA.

3.3 Investments in capital goods

The investments in capital goods in 19 Latin American countries from 1976 to 1981 are provided in table 30. The average annual growth rate of investment between 1976 and 1981 was the same as for imports, viz. 4.2 per cent. Chile showed the highest increase, as its investments almost tripled. Investments almost doubled for Nicaragua and the two oil-exporting countries Ecuador and Mexico. Colombia and Uruguay invested roughly 66 per cennt more in capital goods in 1981 than in 1976. Paraguay roughly invested 50 per cent more in 1981 than in 1976. The Dominican Republic invested 40 per cent more. Remarkable decreases occurred in Bolivia (down by 44 per cent), El Salvador (down by 36 per cent), Brazil (down by 14 per cent), Guatemala (down by 12 per cent). It should be kept in mind that in many cases local factors might cover up general trends, e.g. the construction of the Itaipú Dam has a greater influence on Paraguay, where the capital goods sector is relatively little developed, than on Brazil.

Table 30. Investments of 19 Latin American countries in capital goods (millions of $US at constant 1970 prices)

	1976	1977	1978	1979	1980	1981
Argentina	2,597.1	3,547.2	2,766.5	3,117.0	3,392.9	2,303.8
Bolivia	164.0	162.5	190.3	148.5	107.7	91.7
Brazil	10,035.4	8,699.8	9,092.3	9,420.6	9,964.5	8,600.2
Chile	338.1	461.3	563.9	646.5	784.9	902.6
Colombia	1,723.0	1,798.9	2,094.8	2,295.3	2,636.7	2,835.0
Costa Rica	192.5	229.1	263.6	294.1	246.3	168.2
Dominican Republic	248.7	272.1	255.0	324.3	325.2	344.6
Ecuador	369.4	443.7	537.8	536.9	600.8	579.7
El Salvador	231.1	283.3	320.2	290.7	179.0	146.6
Guatemala	325.7	356.5	391.3	345.6	278.6	285.7
Haiti	57.5	64.3	70.2	64.0	67.8	66.9
Honduras	130.9	147.4	198.4	208.3	215.6	175.8
Mexico	6,569.1	5,785.9	6,802.2	8,821.5	10,388.7	12,384.0
Nicaragua	92.2	151.7	85.3	34.1	101.0	182.8
Panama	199.4	154.7	184.4	182.0	178.4	-
Paraguay	159.3	207.3	222.2	249.8	257.2	244.6
Peru	963.7	740.7	594.1	642.7	847.1	1,092.5
Uruguay	184.1	208.4	168.7	238.0	330.2	244.1
Venezuela	2,725.9	3,748.9	3,469.1	2,576.6	2,491.8	2,992.8
Total	27,307.0	27,463.5	28,270.2	30,437.2	33,394.5	33,641.8

Source: Division of Statistics, ECLA.

It should be noted that the composition of the data and the statistical sources of the import and investment figures are different. Normally customs offices compile data on imports and central banks compile investment data. Hence figures cannot be used for calculating internal production. It is noteworthy that for all years Bolivia shows higher imports than investment values, which must be attributed to differences in data-treatment by the offices producing the statistics.

3.4 Present situation and future development of demand by sectors

3.4.1 Electricity generation

The analysis by the project team at ECLA covers South and Central American countries. Installed capacity in 1960 for electricity generation was 50 per cent. In 1979 the capacity for thermoelectric plants was 40 per cent. This share is expected to drop by one-third in 1990 and one-fourth in 2000. Hydroelectric plants will thus increase their participation from 50 per cent in 1960 to about 75 per cent in 2000 due to the abundant water resources in Latin America. According to the plans of the different countries as they stood in 1982, total installed capacity will increase to approximately 200 GW in 1990 and to approximately 260 GW in 2000 (see table 31).

Even if reduced economic growth in the next five years reduces energy demand in Latin America, the growth potential of electricity generation, especially hydroelectric generation, will most probably develop quite favourably. Tables 32 and 33 give an order of magnitude of this future demand if the 1982 plans for future expansion of electricity generation until the year 2000 are implemented. For the initiated hydropower projects, approximately 700 turbines and corresponding generators, transformers and other electric equipment will be needed. Together with the hydropower sets under construction at the present time (237 units), the demand for turbines will add up to approximately 950 units by 2000, increasing the installed capacity by roughly 136 GW.

The new installations in thermoelectric units (approximately 130 planned units and 120 under construction) amount to 250 plants. The average size of the hydroelectric plants is estimated to be 142 MW, for the thermopower plant the size is estimated at 172 MW.

This expansion plan for electricity generation will bring about a corresponding demand for power and distribution transformers, switchgears, sub-stations and power transmission lines. The required power transformer capacity is estimated at 144 GVA, and, partly caused by the great distances in Latin America, the length of transmission lines of 100 KV or more is calculated to be approximately 60 thousand km.

Table 31. Development of electricity generating capacity in Latin America, 1960-2000 (megawatts)

Year	Hydroelectric capacity	Thermoelectric capacity	Total
1960 a/	5,971	5,991	11,962
1965	10,483	9,581	20,064
1970	17,381	12,933	39,314
1975	30,414	18,646	49,060
1979	42,560	28,398	71,958
1990	133,386	67,618	201,004
2000	193,161	69,636	262,797

a/ Not including Ecuador and Uruguay due to lack of data for 1960. The error is less than 5 per cent as both countries together have an installed capacity of 588 MW in 1965.

The annual investment figures for hydroelectricity generation during this decade amounts to $US 8.7 billion, of which $US 3.5 billion is to be spent on machinery and equipment. This figure represents approximately 9 per cent of the total demand for capital goods in the different sectors.

The expansion plan for electricity generation in the Dominican Republic is not included in Table 31. The plan of the state-owned Corporación Dominicana de Electricidad foresees the installation between 1982 and 1992 of

Table 32. Latin America: turbines to be installed in the period 1980-2000[a/]

Type of turbine	Turbines with minimum power of: 0 - 25 MW		≥ 25 - 50 MW		≥ 50 - 100 MW		≥ 100 MW		Total	
	Number of turbines	Power MW	Number of turbines	Power MW	Number of turbines	Power MW	Number of turbines	Power MW	Number of turbines	Power MW
Under construction										
Bulb	-	-	-	-	-	-	-	-	-	-
Kaplan	2	20.0	3	120.0	-	-	37	4,565	42	4,705.0
Francis	1	19.0	6	212.0	6	476.0	83	34,212.0	96	34,919.0
Pelton	3	70.0	6	210.0	3	216.0	15	2,150.0	27	2,646.0
Not classified	3	16.0	27	1,010.0	23	1,495.0	19	2,664.0	72	5,185.0
Total	9	125.0	42	1,552.0	32	2,187.0	154	43,591.0	237	47,455.0
1990										
Bulb	-	-	-	-	-	-	-	-	-	-
Kaplan	4	16.6	5	215.0	11	614.0	49	6,200.0	69	7,045.6
Francis	5	42.8	5	180.0	27	1,960.0	77	18,810.0	114	20,992.0
Pelton	-	-	11	332.0	6	406.0	16	2,360.0	33	3,088.0
Not classified	11	164.0	-	-	24	1,693.0	4	600.0	39	2,457.0
Total	20	223.4	21	717.0	68	4,673.0	146	27,970.0	255	33,583.4
1990-2000										
Bulb	-	-	-	-	88	5,604.0	-	-	88	5,604.0
Kaplan	-	-	-	-	24	1,464.0	30	4,346.0	54	5,810.0
Francis	2	42.0	4	136.6	53	3,703.3	157	27,589.9	216	31,450.0
Pelton	-	-	4	110.0	13	886.0	16	1,913.0	33	2,909.0
Not classified	2	46.0	2	60.0	37	2,934.0	29	5,745.0	70	8,785.0
Total	4	88.0	10	306.6	215	14,591.3	232	39,573.0	461	54,558.9
2000										
Bulb	-	-	-	-	88	5,604.0	-	-	88	5,604.0
Kaplan	4	6.6	5	215.0	35	2,078.0	79	10,546.0	123	12,855.5
Francis	7	84.8	9	316.6	80	5,663.3	244	46,370.0	330	52,443.2
Pelton	-	-	15	432.0	19	1,292.0	32	4,273.0	66	5,997.0
Not classified	13	210.0	2	60.0	61	4,627.0	33	6,345.0	109	11,242.0
Total	24	311.4	31	1,023.6	293	19,264.3	388	67,543.0	716	88,141.7

a/ Public services only.

Source: ECLA. elaboration based on official data.

Table 33. Latin America: thermoelectric groups to be installed in the period 1980-2000[a/]

	Thermoelectric groups with minimal power of: 0 - 25 MW		≥ 25 - 50 MW		≥ 50 - 100 MW		≥ 100 MW		Total	
	Number of groups	Power MW	Number of groups	Power MW	Number of groups	Power MW	Number of groups	Power MW	Number of groups	Power MW
					Under construction					
Steam	7	85.0	1	37.5	10	725.0	45	10,251.0	63	11,098.5
Turbine	11	209.0	11	328.0	12	640.0	1	280.0	35	1,457.0
Diesel	5	20.0	-	-	-	-	-	-	5	20.0
Nuclear	-	-	-	-	-	-	5	3,842.0	5	3,842.0
Geothermic	5	25.0	1	30.0	-	-	4	440.0	10	495.0
Not classified	1	10.0	-	-	4	264.0	-	-	5	274.0
Total	29	340.0	13	395.5	26	1,629.0	55	14,813.0	123	17,186.5
					1990					
Steam	6	55.0	11	370.5	9	641.0	58	16,310.0	84	17,376.5
Turbine	2	36.0	6	172.0	8	480.0	-	-	16	688,0
Diesel	-	-	-	-	-	-	-	-	-	-
Nuclear	-	-	-	-	-	-	5	5,435.0	5	5,435.0
Geothermic	-	-	2	70.0	11	605.0	2	200.0	15	895.0
Not classified	-									
Total	8	91.0	19	612.0	28	1,726.0	65	21,965.0	120	24,394.5
					1990-2000					
Steam	2	30.0	-	-	-	-	-	-	2	30.0
Turbine	-	-	2	50.0	-	-	-	-	2	50.0
Diesel	-	-	-	-	-	-	-	-	-	-
Nuclear	-	-	-	-	-	-	2	1,288.0	2	1,288.0
Geothermic	-	-	-	-	1	55.0	-	-	1	-
Not classified	-	-	-	-	-	-	-	-	-	-
Total	2	30.0	2	50.0	2	55.0	2	1,288.0	7	1,423.0
					2000					
Steam	8	85.0	11	370.5	9	641.0	58	16,310.0	86	17,406.5
Turbine	2	36.0	8	222.0	8	480.0	-	-	18	733.0
Diesel	-	-	-	-	-	-	-	-	-	-
Nuclear	-	-	-	-	-	-	7	6,723.0	7	6,724.0
Geothermic	-	-	2	70.0	12	660.0	2	220.0	16	910.0
Not classified	-	-	-	-	-	-	-	-	-	-
Total	10	121.0	21	692.5	29	1,781.0	67	23,255.0	127	25,773.0

a/ Public services only.

Source: ECLA, based on official data.

approximately 530 MW in hydropower generation, 805 MW in coal-fired plants, 75 MW in heavy oilfired thermal plants and 112 MW (2x56) in gas turbines for peak load service for a total of 1,522 MW. Coal-based thermal power plants are planned. Blocks of 200-300 MW are planned for 1995 and beyond. Hydroelectric generation is limited by climatic and topographic conditions. The electric power company plans to install or enlarge 22 hydropowerplants, the biggest of which is approximately 100 MW. All others are in the range below 40 MW, the smallest one being 6.4 MW. Besides these investments, the National Water Resources Institute plans to install 9 mini-hydro plants of 1 to 6 MW. The corresponding dams will mainly serve flood controls, and the electricity generated will be sold to the power company. 86/

3.4.2 Pulp industry

The anlysis of this sector covers the demand in Central and Latin American countries, and also indicates the possible share of medium-sized or small countries can take in the construction of pulp plants.

In the 1970s, regional pulp production rose from approximately 2 million tons to 5 million tons, at an average growth rate of 8.5 per cent per annum. Based on the identified projects planned for implementation, the annual increase of the installed capacity is estimated at 4.6 million tons per annum for chemical pulp and 1.0 million tons per annum for mechanical pulp production processes. A supply/demand comparison for 1991 shows that, based on these figures, Latin America will have an excess production of chemical pulp of 3.5 million tons per annum and a deficit of 0.5 million tons per annum of mechanical pulp (world imports of wood pulp in 1978 were 13.8 million tons). The analysis shows further that the average plant size will be 110 thousand tons per annum and 60 thousand tons per annum for pulp produced both chemically and mechanically. Forty-six plants will be installed for chemically produced pulp and sixteen for mechanically produced pulp (see table 34).

Table 35 shows an estimate of the magnitude of investment required. Based on average costs of pulp plants, the demand for pulp production equipment amounts to $US 2.0 billion for the period to 1991.

Table 34. Demand for pulp plants, 1982-1991[a/]

	Increase of installed capacity 1982-1991 (1000 tpa)	Average capacity (1000 tpa)	Number of plants[b/]
A. Chemically produced pulp			
Plants based on projects	3 842	100	38
Additionally required plants	762	100	8
Total	4 604		46
B. Mechanically produced pulp			
Plants based on projects	466	58	8
Additionally required plants	492	60	8
Total	958		16
C. Half-mechanically produced pulp			
Plants based on projects	40	40	1
Additionally required plants	-	-	-

a/ Year of start-up of plants.

b/ Expansion of plants and new plants.

Table 35. Demand for equipment for the production of pulp, 1982-1991

	Number of plants	Demand of equipment per plant		Total demand of equipment	
		Weight (tons)	Value ex-factory ($US million)	Weight (tons)	Value ex-factory ($US million)
Chemical pulp	46	6,650	40.7	305,900	1,872
Mechanical pulp	16	890	8.8	14,240	141
Semi-chemical pulp	1	890	8.8	890	9
Total	63	8,430	58.3	321,030	2,022

Estimates are based on information on a chemical pulp plant using sulfate of a capacity of 500 tpa and a thermomechanic pulp plant of 300 tpd.

Chile, countries of the Andean Pact and Central America have a share of approximately 29 per cent in this demand. Their demand value is calculated to be $US 585 million. With the installed production equipment, these countries could produce approximately 17 per cent of this demand, i.e. $US 96 million. Under a co-operative scheme between the main supplier of the technology and equipment, this share could be raised to approximately 35 per cent, i.e. approximately $US 206 million.

3.4.3 Cement industry

In Latin America and the Caribbean, there exist 170 cement plants, of which 150 are in ALADI countries. The other Spanish-speaking countries have 13 plants, six are installed in Cuba and seven are located in the Caribbean and Suriname. The demand analysis concentrates on the ones installed in ALADI and CACM countries.

Installed production capacity is 77 million tons per annum; 25 per cent of this is based on the technically outdated, wet production process. Ninety per cent of the production capacity is based on natural gas or fuel oil, but conversion to coal is underway in many installations.

In 1981 plants with a production capacity of approximately 24 million tons per annum were under construction or put into operation. In the period 1982-1985, 41 new plants will be constructed, and 98 more between 1986 and 1991, giving a total for the 10 year period of 139 plants (rotary kilns) with an estimated production capacity of approximately 104 million tons (see table 36). Total investment for the machinery and equipment for these plants is estimated at $US 7 billion.

The medium-sized and small countries will have a joint average annual demand of approximately 2.6 plants per year but the bulk of the demand for new cement factories will originate in the three large Latin American countries. Approximately 25 per cent of the value of the equipment (and 40 per cent of the weight) can be produced by the medium-sized and small countries alone.

Table 36. Demand for new lines of rotary kilns for cement production in Latin America, 1982-1991[a/]

	Plants operating in 1981 and/or under construction		Potential Demand								
			1982-1985 (4 years)			1986-1991 (6 years)			1982-1991 (10 years)		
	Number of new plants and expansions	Production capacity of cement (1,000 t/p.a.)	Number of kilns	Average kiln size (1,000 t/p.a.)	Production capacity of cement (1,000 t/p.a.)	Number of kilns	Average kiln size (1,000 t/p.a.)	Production capacity of cement (1,000) t/p.a.)	Number of kilns	Average kiln size (1,000) t/p.a.)	Production capacity of cement (1,000) t/p.a.)
Argentina	2	1,700	3	660	1,960	10	820	8,200	13	781	10,160
Brazil	-	6,660	20	660	13,200	38	820	31,160	58	757	44,360
Mexico	15	10,500	12	820	9,840	30	820	24,600	42	820	34,440
Andean Group	-	4,125	6	500	3,000	14	600	8,400	20	570	11,400
Chile, Paraguay, Uruguay	2	1,100	-	-	-	5	600	3,000	5	600	3,000
CACM	1	400	-	-	-	1	500	500	1	500	500
Total (16 countries)	-	24,485	41	680	28,000	98	775	75,860	139	750	103,860

a/ Based on construction start-up.

This expansion of the cement industry will require the following machinery:

- Rotary kilns (139 units)
- Jaw or cone crushers (104 units)
- Cone or hammer crushers (104 units)
- Hammer crushers (39 units)
- Ball mills for raw materials (139 units)
- Ball mills for clinkers (139 units)

Demand estimates in terms of weight and value are provided in table 37.

Table 37. Demand estimates for specific machinery and equipment in the cement industry, 1982-1991

Type of equipment	Weight (thousands of tons)	Value (fob) (millions of $US)
Big electric motors and speed reducers	55	500
Big crushers and mills	105	750
Rotary kilns	160	900
Big ventilators and rotary separators	15	100
Continuous transporters and cranes	120	650
Other mechanical equipment	190	1,200
Electric equipment	75	1,400
Instruments	-	400
Boiler shop product	50	200
Tubes	55	200
Metal structures	80	300
Grinding bodies	95	200

3.4.4 Steelmaking

It is hardly possible to estimate the future demand for capital goods in the steelmaking sector under the present circumstances. First, among the Latin American steelmakers themselves, the plans for and opinions on the future are unclear. Two years ago the estimates for 1990 steelmakers' investments were in the order of $US 55 billion ($US 1,000 per ton of steelmaking capacity). This figure has been reduced lately to a maximum figure of $US 39 billion, a probable figure of $US 33 billion and a minimum figure of $US 23 billion. However, the difficulties of steelmakers in other parts of the world, the reduction in production output of the metalworking industries of Latin America and the slowdown in investment in general give grounds to fear that even the average investment figure of $US 33 billion for 1990 is highly optimistic. Maybe one should consider a period until 1995 for such an investment development in order to allow time for a recovery in steel production or even extend the period to 2000 if the negative gross investment figures do not show an upturn in 1984. The amount of 33 million tons of steelmaking capacity, equivalent to $US 33 billion, represents more than 90 per cent of the actual capacity (see table 38).

It is estimated that Argentina, Brazil and Mexico represent approximately 80 per cent of the investment in the region, the Andean Pact represents 18 per cent, and Chile, Uruguay and Paraguay represent 2 per cent. The demand analysis apparently has not taken into consideration the electric smelters installed in the Dominican Republic (the capacity is approximately 108,000 tons per annum).

With respect to possible local production, the demand analysis mentions that 100 per cent of the steel structures can be locally supplied, as well as 80 per cent of the cranes, 70 per cent of the reheating furnaces, 50 per cent to 60 per cent of steelmaking furnaces or direct reduction equipment and 30 per cent to 60 per cent of the different types of rolling mills. Local supply possibilities for other equipment items are marginal or reach a maximum of 30 per cent. The percentages refer to the weight of the equipment.

Table 38. Latin America: present and projected capacity of the steelmaking industry based on a hypothesis of major probability (thousands of tons per annum)

Countries	Hypothesis of major probability		
	1980	1990	Increase
North America			
Mexico	9.50	16.60	7.10
Central America (including Trinidad and Tobago)	1.10	1.26	0.16
South America			
Argentina	5.00	7.60	2.60
Bolivia	-	0.12	0.12
Brazil	16.00	31.80	15.80
Chile	0.80	1.10	0.30
Colombia	0.50	1.60	1.10
Ecuador	0.05	0.45	0.40
Paraguay	-	0.18	0.18
Peru	0.50	1.20	0.70
Uruguay	0.05	0.16	0.11
Venezuela	2.50	6.80	4.30
Total	36.00	68.87	32.87

Note: The electric smelter capacity (approximately 108,000 tons per annum) of the Dominican Republic has not been included in this table. Since less than half of the actual Dominican demand of steel products is met by local production, the capacity will most probably be expanded until 1990. Due to economies of scale, the expansion will be in the order of the present capacity.

Source: UNIDO, CEPAL and ILAFA.

3.4.5 Railway equipment

Railway transportation has been sluggish in Latin America in the past. Only Mexico and Brazil transported more goods by railway in 1977 than in 1950. In Mexico, Brazil and Uruguay, rail transport has a significant share in the transport systems, falling short of 20 per cent of the total.

Due to the poor development of freight by railroads the railroad organizations in the different countries did not dispose of investment funds for the renewal of equipment. There are extensive plans to remodel the railway systems in the future. Table 39 indicates estimates of the future demand of rolling material by country. These figures show the predominant importance of Brazil with respect to locomotives and foreign cars (61 per cent and 47 per cent respectively), Argentina (9 per cent and 14 per cent respectively) and Mexico (23 per cent and 30 per cent respectively), representing over 90 per cent of the regional market.

Table 39. Demand for rolling material for railways in Latin America, 1980-1990 (units)

	Locomotives	Freight cars	Electric cars	Trail cars
North America				
Mexico	925[c/]	23,934	-	181
Central America	11	675	-	-
North America				
Argentina	385	11,497	160	-
Bolivia	9	471	-	40[a/]
Brazil[b/]	2,497	37,818	367	42
Chile	12	1,549	-	-
Colombia	47	1,452	-	28
Ecuador	5	80	-	10
Paraguay	4	142	-	10
Peru	67	1,436	-	35
Uruguay	23	-	-	20
Venezuela	70	1,308	-	130
Total	4,066	80,363	527	496

a/ Already contracted.
b/ 23 locomotives, 700 freight cars and 150 electric cars already contracted.
c/ 147 units already contracted.

Source: La industria ferroviaria latinoamericana - Análisis de integración sectorial, BID - INTAL, 1980.

3.4.6 Merchant ships

In the 1970s the tonnage of merchant ships with 1,000 or more GRT (gross registered tons) increased by 131 per cent in Latin America (the world figure was 95 per cent). Parallel to this development, the percentage of seagoing vessels increased from approximately 50 per cent to 75 per cent at the expense of cabotage, and Latin American countries increased the number of specialized ships, principally bulk carriers, in their fleets.

For the decade until 1990, the demand for merchant ships has been estimated as follows:

- Demand due to expansion of fleet: 4.6 million GRT
- Demand due to renewal of fleet: 2.1 million GRT
- Total: 6.7 million GRT.

On the basis of this estimation the fleet's tonnage was increased by 4 per cent annually (9.7 million GRT) to fulfil requirements of international trade of Latin America and the replacement of 50 per cent of the ships more than 20 years old.

The major demand is for bulk carriers (17 per cent), common cargo ships (12 per cent), tankers (11 per cent), combinations (9 per cent), rapid cargo ships (5 per cent) and roll-on-roll-off ships (3 per cent). Demand for gas tankers, container ships, chemical tank ships and vehicle transporters lies between 1 per cent and 2 per cent each; the remaining demand is for other types of ships.

The possibility for the participation of medium-sized and small countries in the construction of merchant ships has been reduced. One of the determining factors is the world-wide excess capacity of ships, continuous specialization in the shipbuilding industry and strong subsidies to the shipbuilding industry in many countries. It might be interesting for medium-sized countries to expand their shipbuilding for fishing (such as Peru) or overhaul and repair ships (Chile, the Dominican Republic or Jamaica), since good possibilities exist to serve regional markets, especially in the Caribbean.

3.4.7 Agricultural machinery

The import value at current prices of agricultural machinery in Latin America increased between 1971 and 1981, but its share in world imports does not show any significant change.

The import share of tractors is 10 per cent higher than that of other product categories. The import share of harvesting machinery shows fluctuation over the years. Lately the share of cultivating machinery has decreased, reaching around 1.7 per cent in 1981, the level of 1975 (see table 40).

The export shares show a very different pattern from those of imports. In fact, the global export share of agricultural machinery increased from 0.4 per cent in 1971 to 2.4 per cent in 1981. Tractors have been the most dynamic product. In 1971, Latin America exported 0.3 per cent of the world trade, increasing constantly until 1975 and reaching a share of 3.5 per cent of the world tractor exports in 1981. The second item in importance is cultivating machinery which increased its share of world exports from 0.8 per cent in 1971 to 1.8 per cent in 1977 and 1.5 per cent in 1981. In the case of harvesting machinery, the share of around 1 per cent has not undergone substantial changes in recent years.

Total Latin American imports of agricultural machinery reached $650 million in 1981, at constant 1975 prices, up from $445 million in 1971 (see table 40). This represents an annual real growth rate of 3.9 per cent. Total exports rose to $146 million in 1981, up from $15 million ten years earlier, representing an annual real growth rate of 25.8 per cent. Thus, although imports still exceed exports by a factor of nearly 4.5, exports grew at a much faster pace than imports. Even more remarkable is the indication that the recent recession appears to have affected imports much more severely than exports, which remained in 1981 at about the 1980 level or even increased slightly for some product groups, whereas imports in all product categories decreased dramatically (see table 40).

Table 40. Latin American imports and exports of agricultural machinery and implements share of the region in world trade, 1971 and 1975 - 1981, in constant 1975 $US million

SITC Rev. I	Description	1971	1975	1976	1977	1978	1979	1980	1981
7121/2 /5/9	Agricultural Machinery and Implements - Total								
	- Imports US $millions	444.8	916.2	654.4	690.1	646.8	682.4	871.6	650.1
	Share in world imports	10.2	10.9	7.8	8.9	8.5	8.2	10.2	10.5
	- Exports US$millions	14.8	82.0	55.1	94.4	113.5	130.0	145.6	146.4
	Share in world exports	0.4	1.0	0.6	1.2	1.5	1.5	1.8	2.4
7121	Cultivating Machinery								
	- Imports US $millions	26.9	51.0	41.6	35.6	39.6	47.3	57.0	48.1
	Share in world imports	8.4	7.2	6.2	5.3	6.0	6.4	7.6	7.1
	- Exports US $millions	2.4	11.9	9.0	11.8	9.6	11.7	13.9	10.1
	Share in world exports	0.8	1.7	1.4	1.8	1.5	1.6	1.6	1.5
7122	Harvesting Machinery								
	- Imports US $millions	94.8	231.1	125.4	132.2	116.6	116.8	214.1	176.8
	Share in world imports	7.7	8.4	5.1	6.3	5.3	4.8	7.3	9.6
	- Exports US $millions	5.6	19.9	18.1	16.3	14.6	12.0	14.4	17.4
	Share in world exports	0.4	0.7	0.7	0.8	0.7	0.5	0.5	1.0
7125	Tractors non-road								
	- Imports US $millions	302.6	603.4	442.2	484.7	455.6	467.5	536.4	396.9
	Share in world imports	13.2	13.7	9.9	10.9	9.7	10.9	11.6	11.9
	- Exports US $millions	6.1	48.4	26.0	63.5	84.4	104.0	114.6	116.8
	Share in world exports	0.3	1.1	0.3	1.4	1.8	2.4	2.5	3.5
7129	Agricultural Machinery and Appliances NES b/								
	- Imports US $millions	20.5	30.7	45.2	37.6	35.0	55.8	64.1	28.3
	Share in world imports	7.0	8.3	6.7	8.6	7.4	7.7	9.5	7.8
	- Exports US $millions	0.7	1.8	2.0	2.8	4.9	2.3	2.7	2.1
	Share in world exports	0.3	0.5	0.5	0.7	1.2	0.5	0.4	0.6

a/ Deflated by the Export Price Index of Agricultural Machinery and Implements, published in the Monthly Bulletin of Statistics. United Nations. New York. February 1983. p. XXX.

b/ Elsewhere specified.

Source: UNIDO/IS.407. p. 12.

The importance of export promotion by manufacturers in the most developed countries of the region is evident in the evolution of the import and export figures for agricultural machinery. In 1971 the imports were 30 times larger than exports, whereas 10 years later they were only 4.4 times greater. Among the product groups, the reduction of imports in relation to exports is most significant in the case of tractors: the ratio declined from 50:1 in 1971 to 12.5:1 in 1975 and to 3.4:1 in 1981.

The share of imports of agricultural machinery in total capital goods imports to ALADI countries oscillated around 4.8 per cent from 1973 to 1980 with a maximum deviation to either side of 1.3 per cent.

Future demand in this sector can hardly be estimated at present since this part of capital goods depends heavily on government policies and overall income developments, as the past has demonstrated. The experience of recent years also shows that the overall demand performance follows closely the demand of the central product of this sector, i.e. the tractor. Out of this concept an estimation is made that the demand of the agricultural sector will be in the order of a magnitude of $US 5.3 billion in 1985, yet all future figures will depend on factors which have to be analyzed carefully.

3.4.8 Mining

Mining is of considerable significance in most of Latin America, contributing substantially to gross domestic product and foreign trade income. However, local productio. of machinery and equipment for the mining sector is almost insignificant in most countries, specially in Chile and in the Andean Pact. The analysis carried out in five Latin American countries (Argentina, Brazil, Chile, Peru and Venezuela) on the demand for machinery and equipment for the mining sector gave the following results: (US$ billion)

Demand of machinery and equipment for new mining projects	2.8
Demand of machinery and equipment for replacement of installations	0.6
Spare parts	2.1
Steel for abrasive uses (e.g. grinding balls, scraper teeth)	0.7
Steel for drilling	0.1
Total	6.3

The analysis covers the metallic mining subsector of the five countries mentioned. Coal projects, e.g. the Zulia project in Venezuela, are not included.

The major demand for replacements is for off-road trucks (34 per cent). This type of transport equipment also accounts for 20 per cent of the demand for machinery and equipment for new projects. Other important machinery and equipment groups of this sector are excavating scrapers (22 per cent) and mills (16 per cent).

An estimation of demand by type of equipment and according to new equipment and replacement is given in table 41. Acccording to these estimates, more than 1,200 off-road trucks will be demanded in the next 10 year-period. The value for metal structures ($US 197 million) refers to general structures and does not include demand of steel structures for specific equipment, which is always included under the specific heading.

As to the share of the countries in the demand for new projects, Argentina has 8 per cent, Brazil 26 per cent, Chile 41 per cent, Peru 24 per cent and Venezuela 1 per cent.

3.4.9 Sugar industry

There are 641 sugar factories installed in those countries which form the GEPLACEA (Group of Latin American and Caribbean sugar exporting countries):[87/] 216 sugar factories are located in Brazil, 149 in Cuba, 66 in Mexico, 26 in Argentina and Costa Rica, 20 in Colombia and 16 in the Dominican Republic.[86/] The sugar-cane milling capacity each harvesting season is 356 million tons, and the capacity utilized in the second half of the 1970s was 258 million tons, i.e. 72 per cent of capacity utilization. Including Brazil's capacity to produce alcohol, the utilized capacity increases to 311 million tons, or approximately 87 per cent capacity utilization.

In the decade of the 1970s, sugar production rose moderately by 24 per cent from 21 million tons in 1970 to 26 million tons in 1979. Due to the population growth in the region and the increase in per capita sugar

Table 41. Argentina, Brazil, Chile, Peru, Venezuela: Demand estimate of machinery and equipment for mining, 1983 - 1992

	Equipment	New projects		Replacements	
		Units	$US million	Units	$US million
1.	Rotative perforators (6"-12 1/4")	147	132	-	-
2.	Perforators-non tracked (3"-6")	59	4	89	6
3.	Raise borers	-	-	-	
4.	Jumbos	10	2	121	30
5.	Power shovels (3-10 sq yd)	93	130	-	-
6.	Power shovels (> 10 cu yd)	140	476	-	-
7.	Frontal loaders (without tires) (5- 7 cu yd)	62	16	98	25
8.	Frontal loaders (without tires) (> 7 cu yd)	96	38	73	29
9.	Scooptrams (2-13 cu yd)	16	4	214	47
10.	Heavy lorries (35-70 ton)	251	93	123	46
11.	Heavy lorries (70-170 ton)	655	459	214	150
12.	Lorries (10-35 ton)	5	1	46	9
13.	Tractors-non tracked (200-700 HP)	303	91	251	75
14.	Road building machinery	186	28	131	20
15.	Special purpose motor vehicles	-	21	-	-
16.	Mining machinery (non-heavy)	-	16	-	-
17.	Extraction machinery (drum and friction	-	2	-	-
18.	Grinding wheel machines (42 x 65" - 54 x 74")	8	7	-	-
19.	Grinding wheel machines (60 x 89" - 60 x 109")	22	48	-	-
20.	Grinding jaw machines (24 x 36" 48 x 60")	3	1	-	-
21.	Cone-shaped grinding machines (5 1/2" - 7")	193	48	-	-
22.	Mills, ball penetrators and bars (< 1000 HP)	112	78	-	-
23.	Mills, ball penetrators and bars (> 1000 HP)	203	365	-	-
24.	Supply apparatus, screen classifiers etc.	-	52	-	49
25.	Flotation equipment (cells, pumps, gutters)	-	81	-	26
26.	Thickeners, filters and dryers	-	81	-	-
27.	Locomotives and wagons	-	43	-	-
28.	Conveyor belts	-	48	-	-
29.	Compressors, water pumps and ventilators	-	72	-	-
30.	Machine tools		11		
31.	Electrical Installations		96		
32.	Metallic structures and boilers		197		
33.	Drill and boring machines		11		13
	Total		2,752		579

consumption (not to mention external factors), sugar exports grew only marginally from 11.5 millions in 1970 to 12.7 million tons in 1979, i.e. 10 per cent. However, the share of export sugar of the sugar produced fell from approximately 55 per cent in 1970 to 49 per cent in 1979. It is estimated that the share of exports will decline to 42 per cent of total production in 1985. Local consumption of sugar rose by 54 per cent in the 1970s, and is expected to grow by an additional 31 per cent (base 1979) until 1985. Total production is estimated to grow to 32 million tons per annum until 1985, an increase of approximately 23 per cent from 1979.

The machinery and equipment installed in the sugar factories (not including equipment in or for the sugar field) was valued at $US 41.1 billion in 1980. Most of the installations are outdated and annual cost for spare parts, replacement pieces and repair is estimated at $US 2.5 billion (6 per cent of the value of equipment). The investment required to increase production in the period 1981 to 1985 is calculated to be approximately $US 13.7 billion. Thus, total investments of the sugar industry are estimated to be $US 26 billion for the period 1981 to 1985, or $US 5.2 billion annually. This is considered to be the minimum investment required, not including any major technological change in production nor major renewal of installed equipment.

Just to indicate the order of magnitude which annual repair may represent for some countries of the region, the total annual cost of $US 2.5 billion for repair and spare parts and replacement prices is calculated pro rata according to each country's share of sugar production. Arithmetically this gives an approximation of annual demand of replacement pieces, spare parts and repairs for various countries: Barbados - $US 11.2 million, Costa Rica - $US 19.5 million, Dominican Republic - $US 115 million, Guyana - $US 39.8 million, Haiti - $US 5.8 million, Honduras - $US 15.7 million, Jamaica - $US 27.9 million.

Even though the major portions of these investments will be special parts and pieces, there seems to be ample opportunity to promote specialized production units for spare parts and pieces for the sugar industry. The plan

for co-operation in maintenance and spare-parts production among the smaller sugarproducing countries might well improve the chances of such production.[88/]

As for investments in new installations, the average size of sugar factories is between 6,000 and 8,000 tons per day of cane. A plant of 6,000 tons per day costs approximately $US 76 million, to which construction works, mechanical and electrical installations (40 per cent or $US 30.4 million) and engineering (10 per cent or $US 7.6 million) have to be added, thus giving a total of $US 114 million (1980 prices). The necessary equipment for the sugar fields is estimated at $US 7.9 million.

The approximate share of the different parts of a sugar factory in the investment cost of $US 76 million is as follows:

	Percentage
Buildings	22.7
Milling ("batey")	6.4
Extraction	21.1
Clarification of crude	3.2
Cristallization of crude	5.0
Centrifugation of crude	2.9
Refining section	7.4
Steam boilers	13.5
Sugar drying, weighing and handling	2.1
Electrical plant	5.0
Tubing	5.4
Ware housing	2.0
Repair shop	2.8
Others	0.5

The equipment for the sugar cane fields (total $US 7.9 million) is as follows:

	Percentage
Machinery and equipment for preparation and cultivation (including 26 tractors)	12.2
Support equipment for preparation and cultivation	1.6
Machinery and equipment for harvesting (including 15 harvestors)	76.9
Support equipment for harvesting	2.1
Central machinery workshop	7.2

4. APPROACHES TOWARDS THE ESTABLISHMENT OF CAPITAL GOODS INDUSTRIES IN LATIN AMERICA

As has been indicated in the previous chapters, the governments of Latin America generally prefer to create the conditions for industrial growth by engaging the private sector in industrial investment rather than by investing directly. Direct actions by governments in industrial installations are normally confined to highly capital-intensive and risky investments.

The creation of the conditions for private activities include government actions at both national and regional levels. At the national level, the outstanding public efforts in education and training of all types (science, technology, vocational), including adult educational programmes, have not only improved employment prospects for the workforce, but have also increased the production capability of the industry.

The following sections are devoted to the efforts of the governments in Latin America towards established capital goods industries on regional and national levels.

4.1 The Andean Pact

4.1.1 General description

The Andean Pact was founded in 1969 to achieve an economic union of the member countries. The treaty went beyond the application of traditional mechanisms for the establishment of trade regions to include liberalization of internal trade, common customs protection, harmonization of monetary and financial policies and laying the ground work for integrated development planning through co-ordination of national development plans and harmonization of social, economic and industrial policies. This ambitious project was designed to accelerate the growth of the participating countries and to achieve more progress in integration and economic co-operation than had been accomplished by LAFTA.

Five basic areas were identified by the agreement with regard to harmonization of policies: (1) the co-ordination of national development plans and the formulation of a subregional development strategy; (2) the harmonization of economic policies, especially policies on external trade; (3) common treatment of foreign capital; (4) harmonization of technological policies; (5) concerted actions on external economic relations.

The achievements made in these areas by the Andean Pact during its first decade of operation were evaluated by the Andean Group.[68/] The only notable achievements were in the areas of common treatment of foreign capital and foreign technologies. In the other areas, the activities hardly kept pace with general progress.

4.1.2 Common treatment of foreign capital and foreign technology

A judicial regulation on the common treatment of foreign capital and trade marks, licenses, patents and royalties was established by Decision 24 (and its amendments) of the Andean Pact.

The statistical data on the amount of foreign investment in the countries of the Andean Pact differ widely. The Junta, executing organ of the Andean Pact, estimates that at the end of 1977 total foreign investment was in the order of $US8 billion, of which roughly one-fourth was in industry. The industrial investment was split up among the member countries as follows: Venezuela, 45 per cent; Colombia, 29 per cent; Peru, 19 per cent; Ecuador, 5.5 per cent; and Bolivia, 1.5 per cent. The total foreign investment in 1977 of the Andean Pact was only one-third of that for Argentina, Brazil and Mexico.

Of the industrial foreign investment in the Andean pact, roughly 60 per cent is in mining and/or petroleum extraction. In second place follows the metalworking sector with 26 per cent, nondurable consumer goods following in third place with 20 per cent. In some cases, the data however are not accurate and should be treated as general indicators only.

The growth rates for foreign investment per country in the 1970s until 1977 were completely different. While the average annual growth rate for the Andean Pact stood at 8.3 per cent per year, for Bolivia it was 4.7 per cent, for Ecuador 3.5 per cent, for Colombia and Venezuela around 8 per cent, and for Peru only 2 per cent.

The least industrialized countries Bolivia and Ecuador had the highest growth rates, benefitting the most from Decision 24 on the treatment of foreign capital.[67/] The fears when this regulation was introduced at the beginning of the 1970s that foreign capital would turn away from the Andean Pact turned out to be groundless. Peru's low growth rate was said to be due to nationalization policies in basic industry and in the agro-industrial sector.

Foreign capital represented half of the total investment in industry in Bolivia in 1977, 17 per cent in Colombia for the years 1971 to 1975, 14 per cent in Ecuador in 1975 and 21.5 per cent in Venezuela (1974). In the period 1968 to 1976, the number of transnational corporations established in the subregion grew from 663 affiliates or branches to 1,228, an increase of 85 per cent.

In the area of foreign technology, the achievements are as follows:

(1) Fewer restrictive practices in supplying the technology for tranfer-of-technology contracts;

(2) A reduction of the direct cost of foreign technology, e.g. reduction from $US 10.5 million in 1970 to $US 5 million in 1979 for royalties paid by Colombia, the estimation of non-direct, non-identifiable costs is much more difficult;

(3) An increase in the purchase of technology instead of rental;

(4) An increase in the negotiating power of the Andean entrepreneurs; and

(5) A growing awareness among the Andean entrepreneurs of the need to regulate technology transfer.

4.1.3 The joint industrial programme (JIP)

In the Cartagena agreement which created the Andean Pact, industrial programming was designated as the essential instrument for balanced industrial development. It was envisaged that the sometimes reduced market sizes would be counterbalanced by special incentives so that each country could equally participate in the establishment of industry considered of importance to the region.

The objectives of industrial programming were summarized in article 32 of the Cartagena agreement as follows:

(a) The expansion, specialization and diversification of national production;

(b) The maximum utilization of resources available in the region;

(c) The improvement of the productivity and efficient use of the production factor;

(d) The utilization of the economics of scale; and

(e) The equal distribution of benefits.[67/]

The joint industrial programme comprises:

(1) The sectoral programmes of industrial development;

(2) The product reservations of industrial production for Bolivia and Ecuador;

(3) The industrial rationalization programmes; and

(4) The integrated development projects.

Three programmes have been approved: (a) The metalworking programme; (b) the petrochemical programme; and (c) the automotive industry programme.

The metalworking programme had its origin in Decision 57 of 1972, with the participation of Bolivia, Chile, Colombia and Peru. Upon the departure of Chile from The Andean Group and the entry of Venezuela, the programme was restructured by Decision 146 in 1979.

The scope of the metalworking programme, which covers only part of metal manufacturing, consists of 267 items grouped into 76 units, defined on the basis of technical and economic criteria of the minimum size of projects which would be possible. These 76 units are divided into 21 units of specialized machinery, 15 units of general machinery, 11 units of machine tools, 7 units of electrical equipment, 1 unit of transport equipment, 14 units of miscellaneous instruments and tools, and 7 units of consumer goods and related products. Of the 267 items which form the scope of the programme production, 122 or 45.7 per cent of them have been verified. This entry into production has not been homogeneous throughout the subregion. Production has been principally in the field of capital goods. Of the 122 items verified, 29 are specialized machinery, 28 are general machinery, 10 are machine tools, 23 are electrical equipment, 2 are transport equipment, 17 are instruments and tools, and 13 are consumer goods and related products.

Decision 57 also calls for the creation of a metalworking committee which would consist of a group of technical experts to advise the Junta on technical matters.

The text of Decision 57 mentions expressly that member countries of the Andean Pact will not allow direct foreign investment within their territories if this investment were to concern projects assigned to another member country. Special attention is paid to the creation of multinational subregional companies. The formation of engineering companies with multinational scope is to be encouraged in order to "promote the technological development of the metalworking industry in the subregion". Other promotional activities are not included in the text. Apparently this had been left to the member governments and CAF (Corporación Andina de Fomento).

As regards political instruments, three areas are mentioned in Decision 57, namely (a) liberalization programme on internal trade, (b) common external customs tariffs and (c) complementary measures.

a) Internal trade: This instrument is intended to achieve the creation of an amplified regional market for the products fabricated under the programme. The agreement foresaw that by the end of 1980 the three large member countries, Colombia, Chile and Peru, would eliminate their customs levies on those products completely. Ecuador and Bolivia would do so by 1985. Non-assigned production is treated like external goods if traded from an Andean Pact country without specific assignment to another member country. Since existing production capacity was taken into consideration in the programme formulation, there was no negative effect on established industries. If two or three countries produced a specific item of the programme, customs would then be fixed on the lowest level applied by one of the countries and successively eliminated. The two less developed countries Ecuador and Bolivia would profit from this customs reduction system as longer periods for the elimination of the customs duties were permitted.

b) Common external customs tariffs: This instrument is intended to establish a common market towards third countries. For the metalworking programme, the external customs tariffs vary between 40 per cent and 80 per cent of value, the arithmetic mean value for the assignments being 56 per cent. Parts and pieces of assigned products are also levied by the same rate. To promote the increase of efficiency of production within the Andean Pact, the external tariff could be reduced gradually upon agreement.

c) Complementary measures: These measures include the traditional promotional instruments such as state subsidies, preferential credit treatments, customs benefits or similar actions in the area of monetary exchange and fiscal policy. The countries would also adopt measures to facilitate the purchase of products of the programme by government enterprises or buying agencies. An Andean Pact country would not promote the installation within its territory of any product assigned to another member country. Furthermore, existing individual export promotion measures would be reduced

gradually as far as subregional trade is concerned. Finally, special mention was made of the creation of multinational subregional engineering industries as a means to promote the technological development of the metalworking industry in the subregion.

For the procedures of assignment, each country has to present a feasibility study or similar techno-economic information two years, at the latest, after Decision 57 entered into force. Production would start within three years after presentation of these documents (for Bolivia and Ecuador six years).

The following conclusions can be drawn from the metalworking industry sectoral programme:

(1) For a further development of production in the metalworking sector, the individual national markets were too small to absorb additional investments in established enterprises or in new ones. The reduced market sizes were also unfavourable to additional technological improvements which were specificaly required so that an additional level of complexity in the production could be achieved.

(2) The emphasis of the sectoral programming was on technological development through the creation or strengthening of the infrastructure importance to the sector (e.g. engineering capacity) which contributed to set up new establishments and specializing in different member countries.

(3) The programme was elaborated and promoted by the executive body of the Andean Pact, the Junta of the Agreement of Cartagena. The national governments did not always agree with the elaborated terms yet the programme was finally accepted without major changes. Peru ratified the agreement in 1972, Colombia and Ecuador in 1973, Chile in 1974 and Bolivia only in 1975.

(4) The main instrument selected to implement the programme was the concession through assignment of production volumes of preferential opportunities for one or more countries in specific sub-branches or products. This was accompanied by a common external tariff and an internal customs liberalization.

(5) Capital goods are predominant in the programme. This results from the fact that three large countries already produce products with easy import substitution characteristics, whereas Ecuador and Bolivia at the time of the formulation of the programme were at the beginning of production in the metalworking sector.

(6) The relatively quick implementation of new production in the first years of the programme led to its success. The programme and the decree on foreign technology have also increased the negotiating power of countries and entrepreneurs with transnational corporations. Transnational corporations have participated extensively in the establishment of additional production facilities, especially through know-how agreements. This is especially the case for production in the two less advanced countries Ecuador and Bolivia, which did not have their own technologies available to meet the requirement of their more advanced assignments.

(7) The exit of Chile and the entry of Venezuela into the Andean Pact required a renegotiation of the metalworking sector programme.

(8) In 1977 exports of products under the programme amounted to $US 9.1. million (up from $US 1.1 million in 1973). The shares of some member countries in 1977 was as follows: Colombia 42 per cent, Peru 19 per cent, Ecuador 29 per cent. These exports were to Peru (51 per cent), Ecuador (30 per cent), Bolivia (15 per cent) and Colombia (4 per cent). The exports almost doubled in 1980 to $US 17.8 million (see table 42), when the shares of the countries were as follows: Bolivia - 39 per cent, Colombia - 28 per cent, Ecuador - 3 per cent and Peru - 30 per cent.

(9) The principal problems hindering improvement of the metalworking programme are considered to be:[68/]

a) Non-stable membership; general lack of confidence by entrepreneurs in the future of the Andean Pact and lack of energetic control of governments on some unaccomplished items.

b) Lack of adequate administration of the programme on regional and national levels, specially for the pragmatic solution of procedural questions.

Table 42. Bolivia, Colombia, Ecuador, Peru: Trade in products forming part of the metalworking sector programme (millions of $US)

Country of origin	1973	1974	1975	1976	1977	1978	1979	1980
Bolivia	-	-	0.2	-	1.0	0.8	3.2	6.9
Colombia	1.1	3.3	3.2	3.8	3.8	2.5	2.5	5.0
Ecuador	-	-	0.2	0.8	2.6	0.5	1.0	0.6
Peru	-	0.3	0.6	1.1	1.7	2.5	4.1	5.3
Total	1.1	3.6	4.2	5.7	9.1	6.3	10.8	17.8

c) Lack of an aggressive promotional and adequate financial system on national and regional levels.

d) Shortfalls in implementation:
   - lack of complementary conventions between the member countries to reinforce the utilization of economies of scale;
   - time delays in the programme; the time for an in-depth analysis of a project was not available in many cases; the entry of Venezuela and exit of Chile contributed to the fact that additional time would be needed;
   - the lack of a general concept to guide joint measures by the member countries led to an unsatisfying situation whereby only the concept of assignment served as the basis for decisions;
   - lack of specific measures on incentives and promotion beyond the creation of an amplified market;
   - lack of concurrent measures to improve the implementation capacity of the lesser developed countries, especially Bolivia.

e) Insufficient action by member countries to implement the agreement, especially delays in signing Decision 57, obstacles in the internal liberalization programme and introduction of external tariffs.

f) Lack of enforcement of the provision of the agreement forbidding parallel establishment of production facilities for assignments made to other countries.

g) Lack of co-ordination of the programme with previous arrangements of some countries with LAFTA, so that some tariffs measures could not be instituted in the manner planned by the programme.

h) Lack of an adequate industrial policy co-ordinated with and focussed on the sectoral programme. The countries continued their own industrial policy without adequately incorporating the programme.

4.2 Other regional treaties with relevance to the capital goods sector

Regional co-operation on the governmental level has a long tradition in Latin America. Its success has often been questioned. However, from the experiences obtained it can be deduced that the efforts at co-operation have continued and contributed to new apporaches under modified schemes.

Only five countries of the area, namely Cuba, Haiti, Panama, the Dominican Republic and Suriname, do not participate in any other treaty on regional integration than SELA.

4.2.1 Latin American Economic System (SELA)

SELA has 26 member countries, practically all of Latin America and the Carribean. The objectives of SELA were conceptualized in 1975 in Panama in a broad and general manner, and neither specific aims nor target dates have been set. The fundamentals of SELA are intraregional co-operation in all areas, promotion of a permanent system of consultations and adoption of joint positions and strategies with other international organizations or countries outside the group on social and economic affairs. Of the five objectives mentioned[43/], two objectives relate directly to capital goods, namely the creation and promotion of Latin American multinational companies and support for development and interchange of technology.

Its technical and administrative body is the permanent secretariat. For specific subjects the creation of Action Committees is anticipated, such as RITAL (Red de Información Tecnológica Latinoamericana), Latin American Network of Information on Technology. RITAL was created to bring together demand and supply of information on technology, contribute to the better utilization of regional technologies and to improve the negotiation capacity towards extra-regional suppliers of technology.

4.2.2 Latin American Integration Association (ALADI)

ALADI is the successor to LAFTA (the Latin American Free Trade Association) and was founded by the Treaty of Montevideo in 1980 after two years of negotiations. It can serve as a bilateral base for co-operations in the capital goods sector. It had become obvious already in the middle of the 1960s that the large Latin American countries with more advanced industrial bases would mainly benefit from LAFTA agreements. This led to the creation of the Andean Pact semi-industrialized countries, giving special protection to the less-developed members Bolivia and Ecuador, and to introduce structural changes to the rigid LAFTA scheme.

Major importance is therefore given in ALADI to special actions in accordance with the flexibility pattern adopted. The multilateral ties of the system are formed by customs preferences and any member country is free to negotiate bilateral or multilateral agreements within this flexible contractual framework. Additional regional treaties in which all ALADI members participate are also possible. However, no timeframe nor specific actions have been proposed to meet the goal of an integrated free-trade area.

The major components of the treaty are:

- Re-negotiated trade preferences
- Customs liberalization
- Regional tariff preferences
- Subregional or bilateral trade preferences.

ALADI distinguishes three groups among its eleven member countries: the three advanced countries Argentina, Brazil, Mexico, the five intermediate countries Colombia, Chile, Peru, Uruguay, Venezuela and the three less developed countries Bolivia, Ecuador, Paraguay. A system of assistance to the less developed countries is anticipated, including an assistance programme and the promotion of multinational Latin American companies for production and sales of products.

4.2.3 The Central American Common Market (CACM)

Member countries of CACM are Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

Despite several set-backs in the bilateral co-operation among member countries, the major achievements of CACM towards the economic integration of Central America are the liberalization of intraregional trade and the establishment of a common outer tariff system. Intraregional trade in the CACM accounts for approximately one-fifth of all foreign trade in Central America. Ninety per cent of this trade is in manufactured goods, although this represents only about 6 per cent of total foreign trade.

The two outstanding regional institutions in Central America are the Central American Secretariat on Economic Integration (SIECA) and the Central American Bank for Economic Integration (BCIE). Although the political situation in the CACM member countries hinders the CACM, the following are the objectives of this organization:

- Readjustment of outer tariffs
- Formulation of an industrial policy
- Setting of priorities in the agrarian and agro-industrial areas
- Improvement of the internal transit system of goods
- Co-operation in energy (based on the 1980 San Jo treaty of Mexico and Venezuela, whereby the equivalent of 30 per cent of oil imports were to form the basis of a credit mechanism on highly favourable terms for investments in economic development.)

4.2.4 The Caribbean Community (CARICOM)

CARICOM was created in 1973 by the English-speaking Caribbean countries, with the exception of the Bahamas in order to achieve trade liberalization, a common outer customs tariff, a harmonization of fiscal policies for industrial promotion, the formulation and implementation of a common agricultural policy and modalities of financial co-operation. In 1981 the smaller member states of CARICOM formed the OECS (Organization of East Caribbean S ates) by means of a former administrative arrangement. Member countries are Antigua, Dominica, Grenada, Montserrat, St. Kitts-Nevis, St. Lucia and St. Vincent, Belize and the four major members Barbados, Guyana, Jamaica and Trinidad and Tobago.

To strengthen the local production of manufactured goods, CARICOM has established that customs preferences for intraregional trade be tied to at least 50 per cent of value added within the region. Since many production inputs are not produced in the region, a basic materials list of approximately 200 products was established. The imports of these products are treated as if they were locally produced. OECS and the four major CARICOM members each apply a common external tariff.

CARICOM contributed considerably to promote industry and trade in the region. Almost half of the internal trade of CARICOM are manufactured products.

The Caribbean Development Bank is another outstanding regional institution. It pays special attention to the less developed countries of the region and supports industrial co-operation among the OECS countries. Approximately 16 per cent of its loans are for industrial projects.[80/]

4.2.5 Financial and monetary co-operation

Apart from the financial regional co-operation as carried out by regional banking institutions already mentioned, there are the following other forms of financial and monetary co-operation of importance to the capital goods sector, e.g. for financing of capital goods sales, and financing of joint ventures.

(1) Payment compensation and trade financing systems: The Andean Pact, ALADI, CACM and CARICOM have each established financial agreements for the payment of their respective intraregional trade through reciprocal credit schemes between their national central banks. This short-term objective has been met satisfactorily, whereas their long-term goal, that is co-ordination of financial and monetary policy, has shown little progress. Thus trade payment schemes have partly been completed by financial assistance agreements under which temporary imbalances are financed.

(2) Banco Latinoamerican de Exportaciones (BLADEX): This institution has been in operation in Panama since 1979. Its purpose is to promote exports of Latin American origin. The bank was constituted by central banks or commercial banks of Latin America and international financial and banking institutions. In the middle of 1981 the bank had made short- and long-term financing commitments of $US 1 billion. 80/

(3) Asociación Latinoamericana de Instituciónes Financieras de Desarrollo (ALIDE): ALIDE includes private development financing institutions and can be considered as a technical co-operation entity in the Latin American development financing environment. In 1981 ALIDE and SELA jointly carried out a study on financing of multinational projects in Latin America. Lately ALIDE also has been treating questions of export financing.

(4) Asociación Latinoamericana de organismos de seguro de crédito a la exportación (ALASCE): This regional association in the field of export credit assurance was created in 1981 by different national institutions of the same nature. The objective of ALASCE is to promote the co-operation among its members to enlarge their activities and to develop their own mechanisms for its tasks.

4.3 National development plans

Detailed development plans on a general national socio-economic level are not customary in Latin American countries. Many countries, such as Mexico, Guatemala and Honduras, do not elaborate national development plans, and in most cases the plans formulate general objectives and refer to major political

issues like GDP growth, employment, productivity, trade balance improvement, etc. More detailed plans might well exist on sectoral levels, including target figures and dates, such as oil production in Mexico or the sectoral industrial programming of the Andean Pact on petrochemicals, steelmaking, metalworking and automotive industries, or also on the degree of self-sufficiency in production in certain sectors or product groups.

A general indication of the existence and the content of development plans is provided in table 43. This table includes only those countries for which development plans were available.

All countries refer to the importance of foreign investment for industrial development. In general the transnational corporations are mentioned in combination with high technology products or with big investment volumes per establishment. Also, all countries expressly mention the role of private enterprise, the function of which might also be taken over by the public sector in specific cases of investment.

4.4 Financing in the capital goods sector

Table 44 shows some indicators related to financial and export credit assurance of some Latin American countries. Only eight of the Latin American countries [78/] have general systems for export financing and credit insurance. The case of Uruguay, where only an insurance system exists, can be considered unique. Of the countries mentioned, Bolivia, Ecuador and Uruguay have no specific financing mechanisms for local sales of capital goods. The eight countries with export financing for capital goods are the most important ones statistically as far as the exports of these products in the region are concerned. Most of the countries lack adequate financial promotion mechanisms to strengthen external sales of locally produced goods.

At the bottom of table 44 regional financing institutions for exports are mentioned. Sistema Andino de Financiamiento de Comercio (SAFICO) disposes of funds of CAF, bonds of CAF placed at the central banks or credit lines of the central banks of member countries. Its export financing can not be used by foreign (i.e. non-regional) enterprises or for exports of products which have

Table 43. General indicators on national development plans

Countries	Years	Target variables						
		No 1	No 2	No 3	No 4	No 5	No 6	No 7
1. Argentina	1971-75	x	x	x	...	x	x	x
	1974-77	x	x	x	...	x	x	x
2. Brazil	1972-74	x	x	...	...	x	...	x
	1975-79	x	x	...	...	x	...	x
3. Chile	1977-82	x			x		x	x
4. Paraguay	1971-75	x	x	x	...	x	x	x
	1977-81	x	x	x	...	x	x	x
5. Uruguay	1963-74	x	x	x	...	x	x	x
	1973-77	x	x	x	...	x	...	x
Andean Pact								
6. Bolivia	1972-77	x	...	...	...	x	x	x
	1976-80	x	x	x	...	x	x	x
7. Colombia	1975-78	x	x	x	x	x	x	x
8. Ecuador	1973-77	x	x	x	...	x	x	x
9. Peru	1971-75	x	x	x	x	x	x	x
	1975-78	...	x	...	...	...	...	x
10. Venezuela	1970-74	x	x	x	x	x	x	x
	1976-80	x	x	x	x	x	x	x
CACM								
11. Costa Rica	1974-78	x	x	x	x	x	x	x
12. El Salvador	1973-77	x	x	x	x	x	x	x
13. Nicaragua	1975-79	x	...	x	x	x	...	x
Others								
14. Haiti	1971-76	x	...	...	...	...	...	x
15. Dominican Republic	1976-86	x	x	x	...	x	x	x

... = No data

List of target variables

No 1 = Global
No 2 = Structure of industrial GDP
No 3 = Exports/imports
No 4 = External and internal supply of industrial products
No 5 = Employment
No 6 = Productivity
No 7 = Public and/or private investments in the industrial sector

been assigned by the sectoral programming of the Andean Pact for production in a different country than the one of origin. BLADEX operates normally through one of its shareholding financial institutions.

Table 44. Some indications on the availability of financing of sales for capital goods

Country	Availability of financing for exports for:				Availability of guarantees and/ or export credit insurance
	Internal market	General and preparatory costs (including studies)	Pre-shipping costs	Post-shipping costs	
Argentina	x	x	x	x	x
Bolivia	x	x	x	x	x
Brazil	x	x	x	x	x
Colombia	x	x	x	x	x
Ecuador		x	x	x	
Mexico	x	x	x	x	x
Peru	x	x	x	x	x
Uruguay					x
Venezuela	x	x	x	x	x
SAFICO				x	
BLADEX				x	
BID				x	

The credit terms for exports of capital goods can in general be considered as acceptable and in some cases in need of improvement. Some examples are given in table 45. The mentioned conditions were valid in 1981, and in some countries there are different credit lines available for export financing with varying conditions. As shown all countries apparently have credits available on the usual international terms and conditions. The exceptional case of Bolivia might result from the relatively little experience in exports and the small volume of its external sales of durable products. The credit systems in the different countries also seem to have the flexibility required for the exports of capital goods.

For the actual sales of capital goods, the financing possibilities for local sales are more important than the export facilities. The "compra-venta" (buy-sell) of capital goods used to be hampered in many Latin American countries by the lack of credit facilities, and in some countries this is still the case, e.g. Paraguay, whereas imported capital goods are financed either by the country of origin or through industrial investment credit lines in Latin America. In Brazil the credits for the purchase of machinery and equipment are given through FINAME (Fundo de Financiamiento para Aquisicao de Maquinas e Equipamentos Industrialis), the financing fund and equipment operating as a subsidiary of the National Economic Development Bank (BNDE).[23/] Credit terms are up to 5 years for a maximum amount of 80 per cent of the value and an 8 per cent to 10 per cent interest rate to which a "del credere" of 2 per cent per year is added. The other countries mentioned in table 47 as having credit facilities for local purchases have similar terms. Figures on the importance of financing for the development of local sales are not available.

4.5 Examples of national activities for the promotion of capital goods production

The importance of financing for the development of national capital goods industries has been laid out in the previous section. Mexico also has a credit line for import-substitution of industrial equipment.

In some countries there exist specific entities of the private or the public sector to promote the national production of capital goods. Three examples, one private (Chile) and two public institutions (Ecuador and Venezuela) are selected here for a brief descriptive presentation.

UNIDO has supported the efforts of the following countries to develop their capital goods sector: Colombia, Ecuador, Guatemala, Mexico, Peru, Trinidad and Tobago and Venezuela. In the Dominican Republic support has so far been given to government development of the metalworking sector and a buy national system.

Table 45. Available credit facilities for the export of capital goods in selected countries

Country	Terms for pre-shipping period			Terms for post-shipping period		
	Credit (% of total amount)	Maximum duration (years)	Interest rate (% p.a.)	Credit (% of total amount)	Maximum duration (years)	Interest rate (% p.a.)
Argentina	85	1	2.5	85	8.5	7.5
Bolivia	80	2/3	12	80	1	10
Brazil	a/	1	40 b/	85	5-8 or more	7.5-8
Colombia	80	1/2	19 b/	100	5-10	
Ecuador	80	1	6	80	5 or more	7c/, 12.5d/
Mexico	85	variable	8	85	8.5-10	7.75
Peru	70	1	56 b/	90	5	10.25-12
Venezuela	80-100	variable	6	100	5 or more	7

a/ Depending on value.
b/ National currency.
c/ First year.
d/ In each following year.

Source: División Conjunta CEPAL/ONUDI, Guía para la descripción de mecanismos de incentivo a la producción y comercialización de bienes de capital y servicios conexos (copia mecanografiada), agosto de 1982.

4.5.1 The Ecuadorian capital goods commission

The Comisión de Bienes de Capital (CEBCA) which has received support from UNIDO (see project No SI-ECU-82-803) was created in 1976 and started its activities in 1978. 77/ Its purpose is to achieve the highest possible participation of engineering and industrial companies of Ecuador in the execution of investment projects and to develop the national capital goods industry and engineering sector. It executes various programmes, among which are:

- A continously renewed inventory of the national consulting capacity, capital goods production and erection and installation of industries or equipment;

- Permanent inventory of investment projects of the public sector;

- Execution of technological disaggregation of investment projects;

- Co-ordination between local demand and supply;

- Assistance to the public sector and users in general on the supply possibilities of the above-mentioned national sectors as well as CEBCA's capabilities on the application of technological disaggregation;

- Design of policies and measures which favour national participation in investment projects and contribute to the development of the above-mentioned sectors.

The position of CEBCA was reinforced in 1982 when decree No. 976 determined that this institution receive the responsibility to assist the public sector, especially in administering projects on the national capacities, technological disaggregation and the elaboration of tender documents. The same decree obligates the public sector to execute those steps and to establish adequate bidding systems which assure national participation in the implementation of projects.

CEBCA estimates that this decree will have an important impact on the national capital goods industry and the consulting and engineering sector, which is estimated in table 46.

CEBCA concludes that the total national value added in table 48 is equivalent to the creation of five year jobs in 28,800 new posts of direct employment. Including three indirect new employees for each direct employee, the total creation of employment is approximately 115,000 posts.

Besides the official CEBCA created by decree No.813 in 1976, the Ecuadorian Federation of Industries (FEDECAPITAL) produces capital goods.

Table 46. CEBCA: minimum national participation in the execution of investment projects, 1983-1987

Concept	Planned investment $US thousands	National participation %	National participation Amount $US thousands	National Value added %	National Value added Amount $US thousands
Studies	800	30	240	90	215
Capital goods	2,900	30	870	60	520
Erection	800	50	400	80	320
Civil works	2,200	60	1,320	80	1,055
Others	840	30	250	60	150
Total	7,540		3,080		2,260

Note: Amounts in national currency were converted into $US ($US 1 = 22 sucres) and rounded.

4.5.2 The National Council for the development of the capital goods industry in Venezuela

The Consejo Nacional para el Desarrollo de la Industria de Bienes de Capital of Venezuela (CONDIBIECA), was created by Presidential Decree No. 621 in 1980. It has 11 members, mainly in the public sector, but also the labour union for metallurgy, the national council on industry and the industrial association for metallurgy and mining. It has the following objectives:[82/]

- To facilitate the realization of studies conducive to promotion and development of the capital goods industry, technological investigation, and national engineering;

- To propose to the government policies and concrete measures to stimulate and expand the capital goods industry;

- To formulate recommendations and submit to the government projects referring to the capital goods sector and also to possible private or public participation in their implementation.

CONDIBIECA has a technical secretariat consisting of an executive secretary and a team of professionals with specific experience in petroleum and metallurgy industries. Among others, the technical secretariat elaborates recommendations on policies and actions in the area of human resources, on property, on fiscal, customs and financial matters, on export promotion and engineering aspects.

This institution has promoted the following government measures implemented by decree:

(1) Buy national-policy: The public sector is obliged to give preference to national capital goods in accordance with specific guidelines.

(2) Preferential financing for a) pre-investment studies, investment on machinery, construction and start-up; b) working capital; c) sales of capital goods including engineering and installation costs. Terms: preferential interest, 15 years, 4 years grace period.

Fiscal incentives: a) up to 50 per cent reduction of income tax for 7 years; b) tax reduction equivalent to 30 per cent of the amount of new investment realized for the production of capital goods; tax reduction equivalent to 30 per cent of the locally produced capital goods (granted to the local producers of those goods); c) export incentives: i) financing at preferential conditions; ii) incentives up to 30 per cent of national value added; iii) preferential steel sales prices for capital goods to be exported; iv) customs protection.

The Council has projected the creation of an information and documentation centre on the capital goods industry and execution of a technical co-operation programme with UNCTAD and UNIDO on demand and supply analysis, political instruments, project evaluation, manpower training, international trade, technological development and information and documentation. This programme is valued at $US 2.38 million and has a duration of 3 years.

4.5.3 The capital goods corporation in Chile

This private non profit making organization was created in 1966 by eight enterprises with interests in capital goods production. Due to certain developments the institution has been relatively inactive for several years but is considering reactivation of its efforts. The purpose of the institution was to co-ordinate between national demand and supply of capital goods, to increase national participation in the supply, to promote the specialization of national enterprises, to assure the procurement of production inputs, to inform on investment programmes of the demand sectors and to gather information on production techniques and quality control.

The organization consists of a small but efficient secretariat which is paid by the members through a sales quota system. In practice the secretariat promoted the participation of the member companies in the bidding of major investment projects.

Almost parallel to this private institution, the Commission of Capital Goods was created as a separate entity but its operating unit, the Executive Secretariat, is directly dependent on the state owned "Corporación de Fomento a la Producción" (CORFO).

5. STRATEGIES FOR ESTABLISHING CAPITAL GOODS AND RELATED INDUSTRIES

Serious set-backs in industrial development have caused many doubts about the future role of industry in the Latin American economies. At the moment few predictions on industrial growth are being formulated since industrial output, especially in the metalworking sector, is still declining in most countries. Still it can be assumed that towards the middle of this decade, the contribution of industry to the gross domestic product will increase again. The critical foreign exchange situation of the countries will most probably cause additional import-substitution efforts which will benefit local manufacturing of capital goods and contribute towards the creation of additional export incentives.

It has been estimated[44/] that the degree of industrialization as indicated by manufacturing value added as a percentage of GDP of Latin America will increase to 34 per cent (37 per cent for the large countries, 28 per cent for the medium-sized countries and 26 per cent for the small countries), and that the metal working industries will have a share in the industrial structure of 31 per cent in 1990 and 39 per cent in 2000 (compared to 45 per cent in 1977 for the industrialized countries). This means a substantial industrial growth, especially in the production of capital goods, which will require additional mechanisms and instruments. Of special concern are, once again, the medium-sized and small Latin American countries requiring elaborate strategies so that their contribution to the production of capital goods in the region is improved.

5.1 Possible activities on national levels

The following discussion relates mainly to the medium-sized and small countries.

5.1.1 Industrial policy

The traditional instruments of the import substitution policy will need refinement and additional accents both in the area of creation of companies producing capital goods as well as in the area of improving their market

access. The example of Venezuela has been mentioned where newly formed companies for the production of capital goods receive a series of advantages such as tax holidays, financing, reduced import duties for raw materials and other production input and the financing of locally produced capital goods at terms similar to the ones usual in international trade.

In many cases, the existing legal and procedural bases are contrary to the local production of capital goods. For example, a newly created company might well receive import duty reductions for its machinery and equipment while a local producer of capital goods will not necessarily have the same benefits for imported steel raw materials. National financing institutions should more thoroughly consider their role in this context.

In some countries the existing laws on industry and promotion of industrial production might be sufficient to meet the requirements for the promotion of capital goods production, yet in some others this might not be the case. In each case a detailed analysis is advisable which will lead to the required recommendations.

5.1.2 Institutional frameworks

Analyses at national levels will most probably show (at least this has been the case in the countries where those analyses have been carried out with the assistance of UNIDO) that the institutional framework is not sufficiently developed to meet the requirements. The need for an institutional development exists in various areas for the capital goods producers:

- Traditional requirements of the capital goods producers;
- Technological information bases, including information on the rapid technological changes taking place in many fields;
- Manpower training, also as they relate to rapid technological change;
- Technical commissions on major projects;
- Analysis of possibilities and conditions of growth of the local capital goods industry;
- Intraregional co-operation and complementation;
- A co-ordinated national effort for dealing with all questions related to capital goods.

Ecuador (CEBCA) and Venezuela (CONDIBIECA) give examples of the type of activities of an officially created entity for the promotion of the capital goods sector. The Dominican Republic, being at a less advanced stage in development of its capital goods sector, is considering the establishment of a "Comité Técnico Metalmecánico" (CTM) to promote local participation in major contracts and especially in government purchases. The legal basis for this action has recently been elaborated in the course of a UNIDO project.[89/] This CTM will, if created, take over similar duties like CEBCA in Ecuador as far as import substitution is concerned.

5.1.3 Technology information basis and technological advancement

Past experience shows that the Latin American countries need a new approach to technology policies. The system of import substitution in many cases brought new production techniques requiring specific manpower skills to Latin America. Yet once this process of transfer and adaptation of technology had been achieved, enterprises did not see the need to further improve their technology since they benefitted from the import protection of the system.

There has been no continuous demand for technological information (when information is needed, it normally is searched for in the industrialized countries) and continuous information treatment and supply mechanisms were not established in the countries. Such a technology information basis, consisting of a documentation centre and specific technology dissemination programmes including workshops, is felt in many cases to be of high priority. It could also address aspects of transfer of technological know-how such as licenses and corresponding contracts so that the negotiating power of the industry can be improved.

An example of the implementation of such an information centre is Venezuela which in this relation receives technical assistance from UNIDO.

5.1.4 Public purchases

In some Latin American countries, 60 per cent or more of all purchases of capital goods are done by government entities, either ministries, institutes or public enterprises. Thus, the government holds a considerable negotiating

force which it can apply to stimulate the local capital goods sector. Yet in many cases there is a lack of entrepreneurial response to the considerable market volume. Possible action for improving this situation:

- Introduction of principles of local purchases as defined in the law creating CEBCA in Ecuador or in the project of the technical metalworking commission CTM in the Dominican Republic;

- Improved information policy of the government on its investment and purchasing plans to serve as a guideline for the industry on the market trend;

- In the case of major investment projects, utilization of a technical disaggregation system to split up major positions of delivery and to allow for partial proposals;

- Incentives for increased local supply to the general contractor of a major investment project.

- Procedural control of tenders (e.g. on delays; in many cases short delivery terms are set which cannot be met by a possible local producer not selling from stocks).

5.1.5 Technical assistance

The examples in the past sections on possible actions give an indication of the scope of political decision-making required and the necessity of a clear and profound analysis of all problems involved in the promotion of capital goods production. The estimte that on average a sales volume of approximately $US 15,000 per annum creates one employment position in the capital goods industry in the medium-sized and small Latin American countries, indicates the magnitude of employment creation involved. For each one of the small and medium-sized countries, the additional employment opportunities are in the order of several thousand additional posts. Yet the actual creation of these employment possibilities requires efforts at various governmental, institutional and industrial levels, as suggested by the given examples.

Their pursuit would most efficiently be carried out by a specifically created multidisciplinary capital goods project team co-operating at high level with all parties involved and elaborating the framework as described above.

In a first phase, this project team would elaborate the requirements in planning, including specific technology assistance programmes, e.g. to foundries, which the capital goods sector will need. A time-table for the implementation of the different efforts and a manpower input plan as well as a cost plan also should be drawn up. The intraregional linkage of the capital goods sector will play an important role as a basis for later initiation and gradual increase of specialization. Therefore, the demand and supply analysis would be an important item of the investigation.

According to UNIDO's experience, such a first phase will take approximately one half year to one year of analysis, report writing and discussion of the recommendations. The subsequent policy implementation phase will need two to four years for the above-mentioned multidisciplinary team. It will conclude with the operational phase of the different institutional entities or committees defined and installed during the previous phases.

5.2 Possible activities of the regional level

From the technological point of view, three forms of joint activities can be defined:

- Technological complementation, whereby two or more countries of the region agree on programming their capital goods industries in a co-ordinated manner. An example of such an effort is the metalworking industry programming in the Andean Pact countries.

- Specialization in selected fields of capital goods, e.g. construction of fishing boats in Peru. Additional areas could be mining equipment in the Andean Pact countries or spare parts and equipment for replacement in the member countries of GEPLACEA. For better efficiency, specialization and technological complementation should be considered jointly.

- Subcontracting where local industry joins a general contractor in the execution of a major investment project. The capital goods industry of the three large Latin American countries are in many cases already well suited to manage major contracts as general contractor.

For progress in regional co-operation in the capital goods industry, a set of political mechanisms will have to be applied and the policy-unit will have to be determined in such a way that a concerted result will provide equal shares of benefits to the participating countries.

The main strategic goal is thus regional co-operation of the Latin American countries in the production and commercialization of capital goods.

5.2.1 Institutional frameworks

Presently, it can be assumed that the different aspects of the capital goods sector are being handled by various national institutions which will concentrate and specialize on specific subjects. The pursuit of this policy will lead to an improved and necessary coherence of objectives amongst institutions.

The great advantage of this form of institutional co-operation is that, from the beginning a large number of public and private economic agents are participating in the structuring of the capital goods sector. On the other hand this procedure will probably also lead to intra-institutional technical assistance between countries at different stages of advancement of the capital goods industry.

5.2.2 Policy co-ordination

The present economical difficult situation of most Latin American countries will make it even more imperative to co-ordinate their development policies, especially industrial, commercial and financial (particularly industrial financing) policies. The scarcity of foreign exchange will force these countries to reduce their investment plans to the most needed projects and to look for new ways of industrial financing. A regional co-operational scheme on this topic might be of benefit for all parties involved.

It is recommended that this scheme concentrate on regional complementation and industrial financing. If adequate financial means are made available to the regional capital goods industry, one can expect a significant positive impact. These financial arrangements should also include the promotion of Latin American joint ventures for the production of capital goods, both for the regional market as well as for third markets outside Latin America.

Regional policy co-ordination will have to be combined and supported by actions on the national level, specifically in procedural matters and facilities available to the industries. Hopefully the negative experiences of the Andean Pact (e.g. there was hardly any financial facility on the national level for investors planning to take up a production line in the framework of the metalworking programme) will not be repeated.

Multilateral policy co-ordination should also include subjects such as co-ordinated production of spare parts for the sugar industry, a project which is at its early stage at GEPLACEA. This subject might be a good example where small countries achieve relative self-sufficiency through market sharing. The same applies for mining industry capital goods production in the Andean countries.

5.2.3 Promotion of industrial co-operation

While the previous forms of regional co-operation relate to various sectoral aspects of the capital goods industry, the promotion of industrial co-operation discussed here refers directly to the enterprise level. Based on national and regional demand and supply analyses, the different possibilities of local production of capital goods and possible forms of co-operation amongst industries can be determined.

The form of co-operation can be continuous as in the case of joint venture, licensing or (reciprocal) representative agreements or project-based formation of a consortium or subcontracting agreements. In both cases the need for preliminary planning and co-ordination during the execution of the project must not be under-estimated.

For various sub-regions it is recommended to promote projects for widening the industrial co-operation among countries. Co-ordination based on sectoral approaches (e.g. sugar industry, energy technologies, food processing industries) can be expected to achieve positive results leading to sub-regional production sharing and trade in capital goods.

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